P012350A

Ericsson GSM System

RBS 2308,RBS 2309

User's Guide

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EN/LZT 720 0027 R2A

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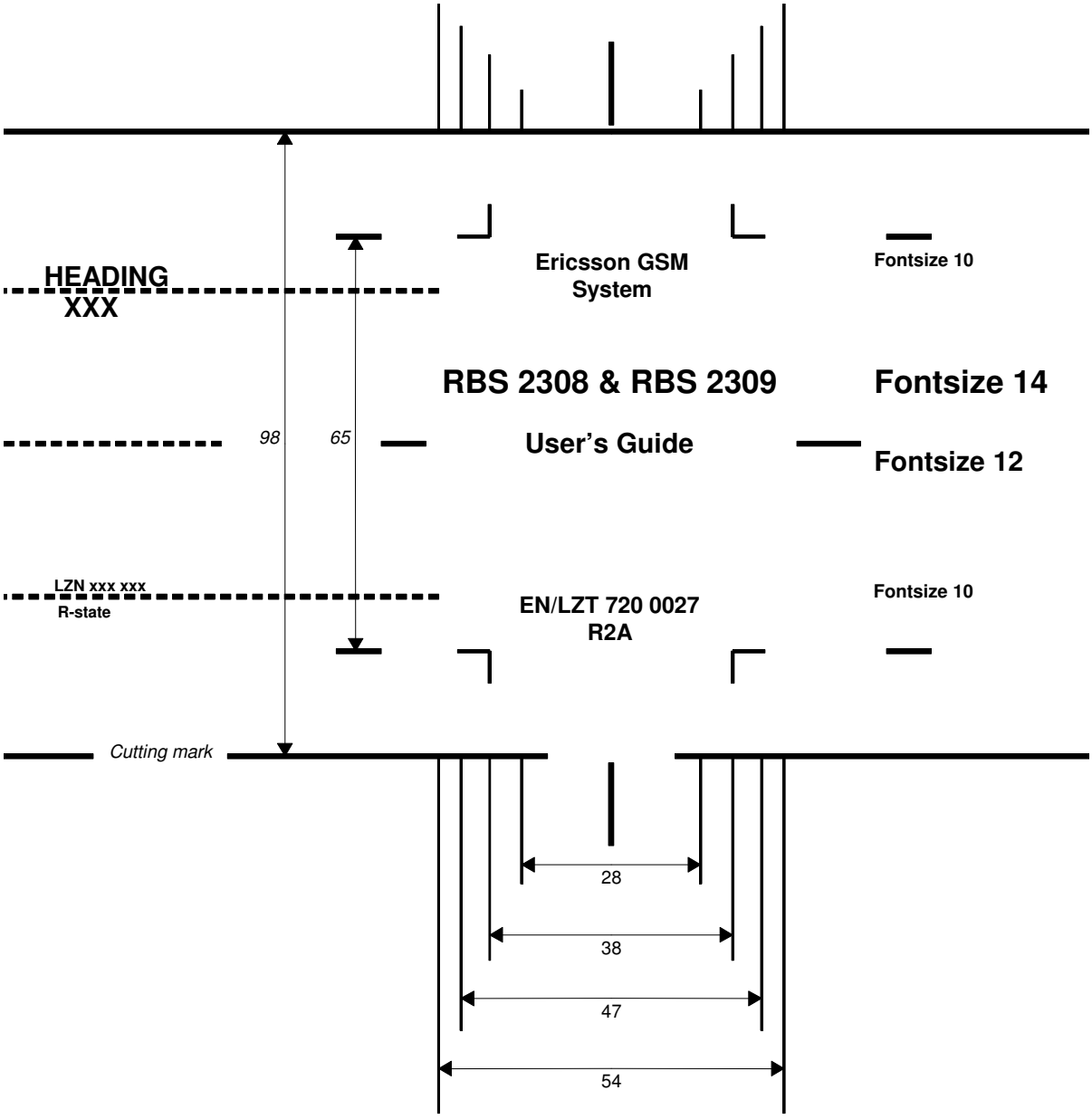
XSNFREH		4/001 59-EN/LZT 720 0027 Uen		
Dokansv/Godkänd - *Doc respons/Approved*	Kontr - *Checked*	Datum - *Date*	Rev	File
Lena Jonsson Borg/EAB		2004-10-21	B	



Doc nr: 2/001 59-EN/LZT 720 0027 Uen Rev B

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RBS 2308 & RBS 2309 User's Guide

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CAPTION LIST

Document No.
EN/LZT 720 0027
RBS 2308 & RBS 2309
User's Guide
Date | Rev
2004-10-21 B

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RBS 2308 and RBS 2309 User's Guide

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1 Introduction

This User's Guide consists of the chapters listed below. Each chapter is briefly summarised.

Introduction

This chapter.

Personal Health and Safety Information

Contains personal health and safety information that applies when working with Ericsson system products.

System Safety Information

Contains system safety information that applies when working with Ericsson system products.

Tools and Instruments

Contains lists of all recommended tools and instruments.

Installation of RBS 2308 and RBS 2309

Describes activities for:

- Installation of the mounting base
- Connection of cables
- Connection of external antenna
- Mounting the radio cabinet on the mounting base

Antenna System Tests

Describes the site specific antenna tests that should be performed on site.

Site Installation Tests

Describes the site specific tests that should be performed on-site.

RBS Site Integration

Describes how to integrate an RBS site into a network.

Maintenance

Describes first line Maintenance. This means that swap repair is carried out on site and that only replaceable units are handled.

Glossary

Contains abbreviations and acronyms used in the text.

1.1 Product Overview

The RBS is a GSM EDGE micro base station for both indoor and outdoor micro cell applications. It is a small yet complete station, with transceivers, switching functions and transmission.

The RBS can be mounted on a mast/pole as easily as it can be fitted to a wall.

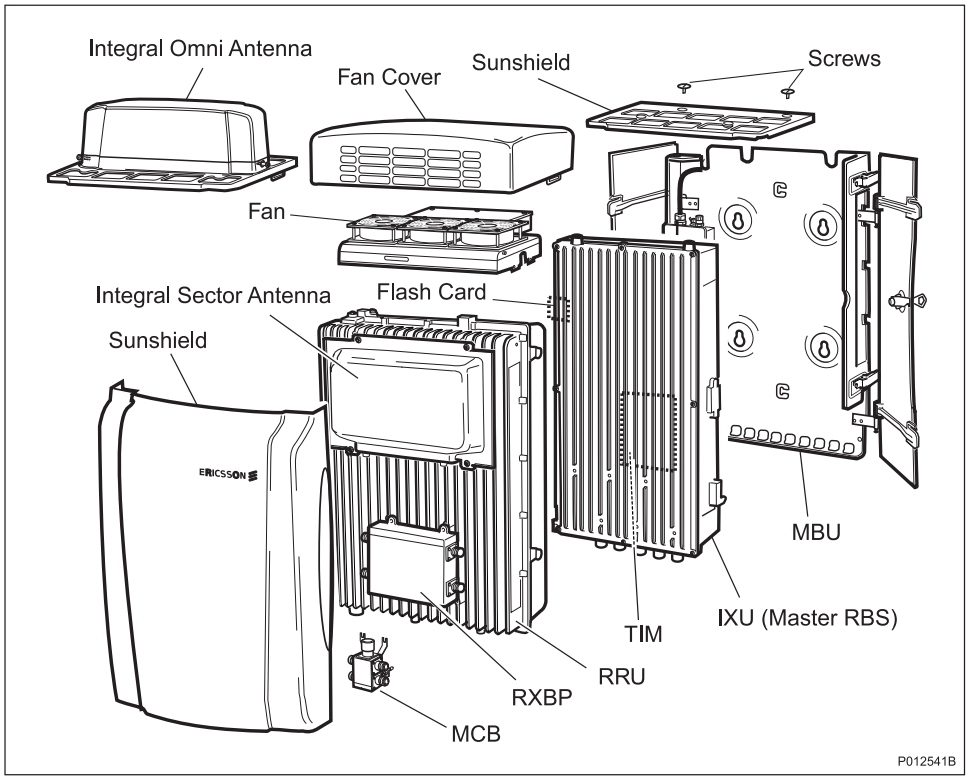


Figure 1 RBS Overview

IXU	Interface and Switching Unit
MBU	Mounting Base Unit
MCB	Multicasting Box
RRU	Remote Radio Unit
RXBP	RX Bandpass Filter
TIM	Transmission Interface Module

External optional battery backup is possible, as well as the option of having integrated antennas within the base station.

1.2 Target Groups

This section describes the target group for this manual, which is all personnel involved in activities relating to the installation and integration of an RBS site.

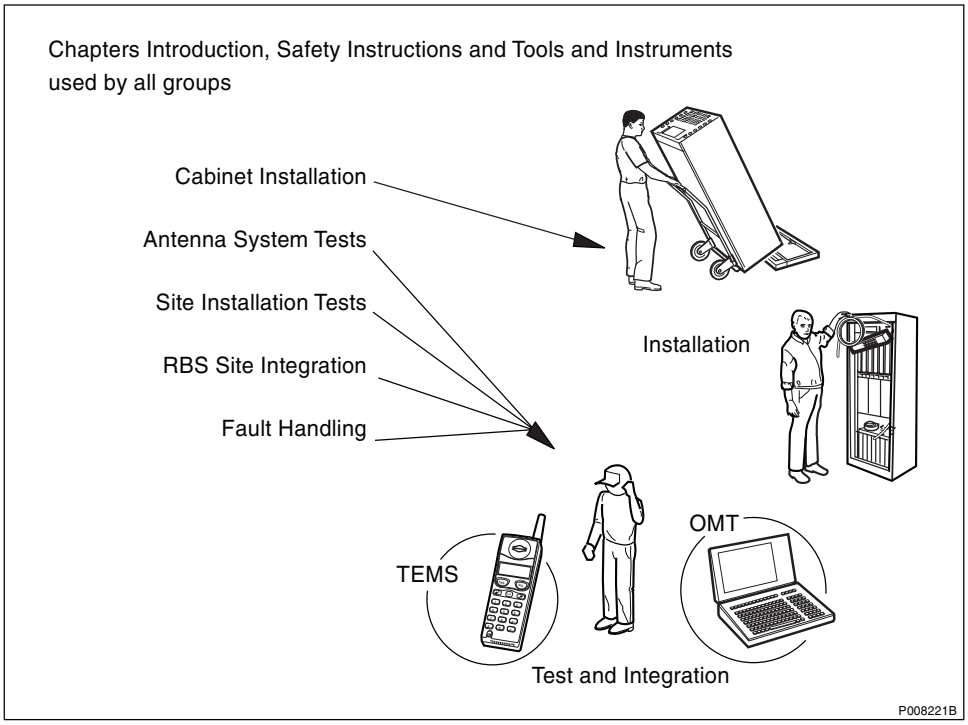


Figure 2 Chapters Related to Specific Target Groups

During the whole Radio Site Implementation (RSI) process and the product's life cycle, the target groups require documents in addition to the above mentioned manuals to complete the work.

Qualifications for Installation Personnel

Ericsson recommends that installation personnel possess the following skills:

- Technical college or equivalent education with an emphasis on electrical engineering
- Familiarity with the equipment used during the installation process
- Knowledge of antenna systems
- Appropriate training and medical certificate for working at heights
- Good understanding of technical English

Qualifications for Test and Integration Personnel

Ericsson recommends that testing and integration personnel possess the following skills:

- Basic Ericsson RBS 2000 Operation and Maintenance knowledge. Personnel should be familiar with the tools and instruments recommended in the chapters *Antenna System Tests, Site Installation Tests,* and *RBS Site Integration*.
- Basic GSM knowledge
- Basic RBS 2000 knowledge
- Good understanding of technical English

1.3 Installation and Integration Process Overview

This section describes the overall Installation and Integration process. This process covers the work that follows the Installation Engineering process: testing the antenna system, installing the cabinet, performing site installation tests, and integrating the site into the network. A process overview is shown below.

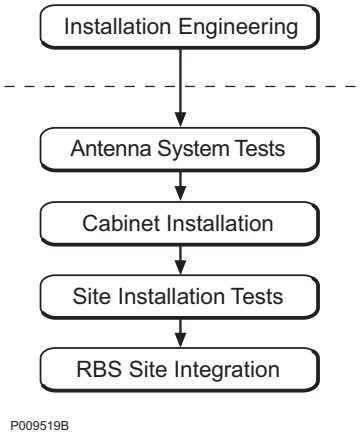


Figure 3 The Installation and Integration Process

1.4 Radio Site Implementation Process

This section describes the overall Radio Site Implementation process, of which the Installation and Integration process is a part. The Radio Site Implementation process covers the work from the initial stages of receiving an order, planning and designing the entire network, to installing the RBS sites and integrating them into the network.

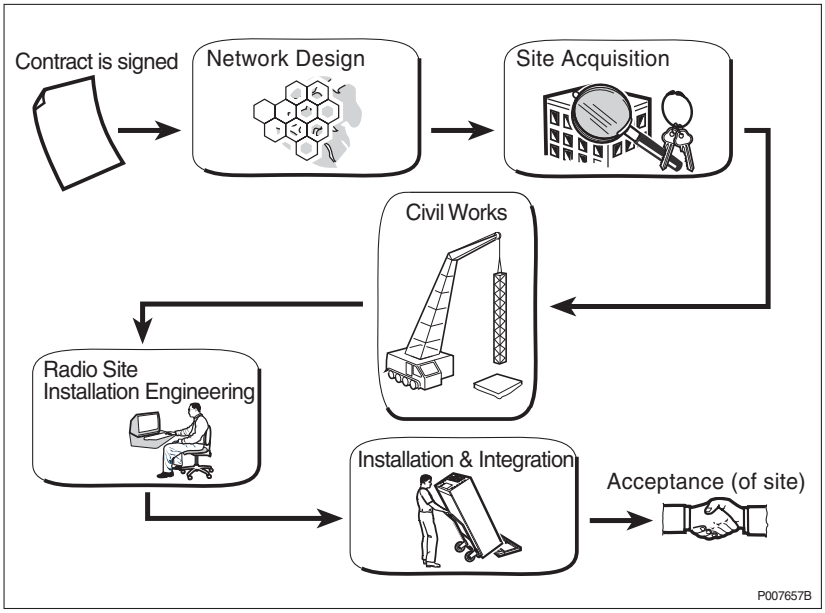


Figure 4 The Radio Site Implementation Process

For further information about the planning process, *see:*

Radio Site Installation Engineering Manual *EN/LZT 302 069*

Network Planning Process

The Network Planning process consists of the following activities:

- Dimensioning of network
- Dimensioning of equipment for radio, transmission, switching, operation and maintenance
- Defining and ordering market adaptation products, for example programs for national signalling towards the public telephone network
- Measurement of radio frequency and interference
- Producing digital maps and data

Site Acquisition

The Site Acquisition process is performed in close cooperation with the Civil Works process and, to some extent, with the Engineering process.

The Site Acquisition process consists of the following activities:

- Searching for sites and obtaining a site appraisal
- Outlining the site design and evaluating the cost
- Negotiating and signing leasing contracts
- Handling permits and arranging a handover to the Engineering personnel

Civil Works

The Civil Works process is performed in close cooperation with the Site Acquisition process and the Engineering process.

The Civil Works process consists of the following activities:

- Preparing a detailed civil works design of the site
- Updating the costs for the site construction
- Arranging the site construction
- Performing a site inspection and handing over an as-built document to the Engineering personnel

Engineering

The Engineering process begins when the Site Acquisition and Civil Works processes are complete.

The Engineering process consists of the following activities:

- Measuring and collecting information about sites
- Designing the antenna and radio configuration, and producing cable drawings
- Making drawings showing the positions of the antenna and RBS equipment
- Defining areas of responsibility between the purchaser and the contractor
- Producing site-specific information in the Site Installation Documentation.

For more information about the results from the site engineering process, *see:*

Radio Site Installation Engineering Manual *EN/LZT 302 069*

Installation and Integration

The work involved in this process is performed by installation personnel, and test and integration personnel.

Installation personnel are responsible for the following activities:

- Installing the antenna system
- Installing the RBS
- Earthing the RBS
- Connecting a power supply to the RBS
- Connecting the antenna system to the RBS
- Installing cable ladders and cable ducts
- Installing battery backup
- Installing PCM cables

The test and integration personnel are responsible for the following activities:

- Performing the tests specified in the contract and integrating the site
- Troubleshooting if tests indicate a fault

- Recording the test results in the Site Installation Documentation, which is returned to the engineering personnel

1.5 RBS Library Overview

For information on the RBS library and other manuals related to the RBS, *see:*

RBS 2000 Library Overview *LZN 302 73*

1.6 Release History

Except for editorial changes, such as the correction of spelling, grammar, and layout, this manual has been revised as follows:

1.6.1 R1A to R2A

RBS 2309

Information about RBS 2309 has been added to the document.

Personal Health and Safety Information

New safety chapter.

System Safety Information

New safety chapter.

Installation of RBS 2308

- Section *Tightening Torques* added
- Section *Installing the MBU on a Wall* updated with a figure that shows connection of site earthing to the MBU
- Section *Installing the IXU (Master RBS Only)* updated with a new figure for earthing of outer shield only
- Updated figure for strapping cables using the appropriate cable tie anchor
- Updated figure for installation of the top sunshield

Antenna System Tests

- Section *Calculating Feeder Delay* added

Site Installation Tests

- Updated figure for RRU and IXU interface panels
- Section *Connecting OMT* updated with text explaining what to do if an extended OMT cable is connected
- Section *Defining Transmission Interface E1, 120 Ω* updated with information about ports C and D as a multidrop pair
- Section *Reading Fault Status* updated with information about what is displayed when an MO fault is selected
- Test record for Stand-alone updated with a check for external alarms

RBS 2308 Maintenance

- Updated figures for RRU and IXU interface panels
- Torque value added for mounting of the TIM
- Updated figure for disconnecting the power cable from the RRU
- New figure for removal of the fan unit

Appendix: Fault List Micro

New fault list including all alarms related to all micro cabinets.

1.6.2 R1A

This is the first release of this manual.

2 Personal Health and Safety Information

2.1 Introduction

This document presents the personal health and safety information that applies when working with Ericsson system products. The instructions included are mandatory to ensure personal safety while working with Ericsson system products.

Note: Reduce the risk of accidents by studying all the information carefully before starting work. If questions arise regarding health and safety information, contact the supervisor or the local Ericsson company for clarification.

For information on product safety for Ericsson system products, see:

System Safety Information, Ericsson System Products *124 46–2886*

Local Regulations

Local regulations, first and foremost national regulations, override the information in this document. Where applicable local regulations are not available, the information herein prevails.

Product Exclusion Indication

The information in this document covers personal health and safety aspects of all Ericsson system products. As all the information does not apply to a specific product, the readers must familiarize themselves with the potential hazards indicated on the product they are working with to understand which document parts apply to their product.

2.1.1 Target Group

The target group for this health and safety information is personnel who work with Ericsson products. All personnel who work with engineering, installation, test, and operation and maintenance of Ericsson products must familiarize themselves with this information.

2.1.2 Educational Requirements

The safety instructions in the relevant manuals or documents require that persons performing work on Ericsson products have the necessary education,

training and competence required to perform work correctly. For certain work, additional or special training may be required, for example authorization for Authorized Service Providers (ASP). ASP is an Ericsson certification procedure.

A good understanding of technical English is required, or of the language that the information is presented in, to ensure that these and other instructions can be understood and complied with.

2.2 Hazard Symbols and Admonitions

This section presents the types of admonitions and hazard symbols used in all Ericsson documentation. There are three levels of personal health and safety admonitions that indicate risk to persons: danger, warning and caution. Hazard symbols are used to indicate these and to present various other hazards.

The admonition levels for personal health and safety are presented in order of severity, with danger being the highest level, warning the intermediary and caution the lowest. When admonitions are encountered anywhere in a document, the information included should be read and any instructions should be followed.

2.2.1 Personal Health and Safety Admonitions

Personal health and safety admonitions are used to indicate hazardous activities and are normally preceded by the common hazard symbol shown in the figure below, or in specific cases by specialized symbols, *see Section 2.2.2 Special Hazard Symbols on page 13*.

Figure 5 Safety Hazard Symbol

The hazard symbol is common for all three admonition levels. The three admonition levels are defined below:

Danger! Indicates that there is an imminent hazard that is likely to result in death or serious injury.

Note: Danger can be accompanied by other symbols depending on the country of operation.

Warning! Indicates that there is a potential hazard that could result in death or injury.

Caution! Indicates a hazard that could result in minor or moderate injury.

2.2.2 Special Hazard Symbols

This section presents special hazard symbols used to indicate the risk of chemical, electric shock, fire, heat, laser and Radio Frequency (RF) exposure hazards:

Figure 6 Chemical Hazard Symbol

Figure 7 Electrical Hazard Symbol

Figure 8 Fire Hazard Symbol

Figure 9 Heat Hazard Symbol

Figure 10 Laser Hazard Symbol

Figure 11 RF Exposure Hazard Symbol

2.3 General Safety Precautions

This section presents general safety precautions to ensure that persons are not injured when working with equipment.

- Items of jewelry, for example rings, watches and necklaces should be removed as they can catch on moving parts, or when lifting equipment.
- Pay attention to the hazard labels and other information labels on products.

- Never remove or cover hazard symbols as this can endanger persons working with the product.
- Only use the tools described, in the manner indicated, in instructions.

2.4 Electric Shock Hazards

This section provides information and instructions relating to equipment operating on voltage that entails an electric shock hazard.

Note: This information only applies to products marked with the electric shock hazard symbol.

The term Electric Shock Hazard is defined below:

Electric Shock Hazard	Hazard at voltage equal to or above 42.4 V peak or 60 V DC.

Danger!

Electric shock risk. Avoid both direct and indirect contact with parts connected to mains power as this is likely to be fatal. Switch off the mains power before starting work.

Danger!

Improper electrical installation may cause fire or electric shock that is likely to be fatal. Only a qualified and authorized electrician is permitted to install or modify electrical installations.

Note: Only qualified electricians are allowed to work directly with equipment that presents an electric shock hazard.

Note: AC mains installation must be carried out according to local regulations.

2.4.1 Safety Precautions for Working with Electrical Equipment

The following precautions must be observed when working with electrical equipment:

- The AC mains is switched off.

- Equipment exposed to moisture is protected with a tent or other equipment.
- Power cables are installed according to instructions.
- Installed cables are always clearly marked with labels.
- All personnel are familiar with and understand the warning signs on equipment.
- Only tested electrical tools are used.
- Holes are never drilled in equipment, or walls, without ensuring that there are no concealed cables.

2.5 Energy Hazards

This section provides information on how to avoid energy hazards.

The term energy hazard is defined below:

Energy Hazard Hazard at a stored energy level of 20 J or an available continuous power level of 240 VA.

2.5.1 Batteries

This section provides instructions and information on the proper handling of batteries.

Note: Where Ericsson is not the supplier of battery equipment, see the manufacturer's information on battery safety.

Caution!

Improper handling of batteries can result in the batteries short-circuiting, which can result in serious injury due to high energy levels. Exercise the necessary care when working with batteries.

Lithium Batteries

Warning!

Switching poles when replacing lithium batteries can result in an explosion that can lead to injury. Always ensure that lithium batteries are connected to the right poles.

2.5.2 Capacitors and Uninterruptible Power Systems

This section provides information on how to avoid energy hazards in Capacitors and Uninterruptible Power Systems (UPS).

Warning!

High energy levels are present in this unit. Improper handling of the unit can lead to short circuiting that can result in serious injury. Exercise care when working with this unit.

Note: Some capacitors and UPSs have energy levels above 240 VA. If this is the case this is indicated on the product with a voltage hazard.

2.5.3 Safety Precautions for Avoiding Energy Hazards

The following precautions must be observed when working with batteries and other units that present an energy hazard:

- All metallic objects worn, such as wrist watches, rings, bracelets, and so on are removed.
- Disconnect the charger power supply until the work is complete.
- Only use insulated tools.

2.6 Fire Hazard

This section provides instructions and information on safety precautions for preventing fire.

Warning!

In the event of a fire, evacuate the building or equipment site and raise the fire alarm at the closest alarm point, or call the emergency number. Do not re-enter a burning building under any circumstances.

Warning!

Heater in operation. Do not block the heater vents or place combustible materials close to the unit, as this can cause a fire that can endanger life.

2.6.1 Fire Precautions

Note: When working with the installation or maintenance of equipment that involves interfering with the fire sectioning of a building, this should be carried out as quickly as possible.

Fire can spread to neighboring rooms. When working on equipment cable ducts, channels and access holes might have to be opened, thereby interfering with the fire sectioning of the building. The instructions below have to be followed when work has been completed to restore the building's fire sectioning:

1. Close the cable ducts and fire doors (if applicable) as soon as possible.
2. Seal cable ducts according to the regulations for the building.
3. Minimize the amount of inflammable material.
4. Remove empty packaging material from the equipment site.
5. Check that there is a functioning powder or carbon dioxide fire extinguisher for electric apparatus at the equipment site.

2.7 Heat Hazards

This section describes how to avoid injury from hot surfaces or hot air in equipment.

Caution!

Parts inside this equipment attain high temperatures during normal operation, which can cause burns to the skin if touched without heat protective clothing. Always use heat protective clothing when working with equipment containing hot surfaces, or switch the equipment off and allow it to cool before starting work.

Caution!

A heater, producing hot air, is in use in this equipment. Direct contact with hot air can lead to burns. When the heater is in operation, avoid close contact with the heater air evacuation vent.

2.8 Mechanical Hazards

This section provides information on mechanical hazards in equipment containing sharp edges or rotating blades.

Caution!

Sharp metal edges may exist that can cause cuts to the skin or clothing. Wear protective gloves when handling this equipment.

Caution!

Rotating fan blades can cause injury to body parts that come into contact with the blades. Blades in fan units continue to rotate for a period of time, even after the fan has been switched off. Wait until fans have stopped rotating completely before starting work on or near fans.

2.9 Radio Frequency Exposure Hazards

This section provides instructions and information on potential hazards related to radio frequency (RF) electromagnetic field (EMF) exposure from fixed radio transmitters (as opposed to mobile phones).

2.9.1 General RF Safety Information

Caution!

Excessive RF exposure can result in potentially adverse health effects. If it is suspected that RF exposure limits may be exceeded, ensure that transmitting antennas are switched off, or reduce output power whilst working with, or near, antennas.

Note: RF exposure limits are specified by national and international health authorities in standards, regulations or guidelines. The limits include wide safety margins to protect from potentially harmful tissue heating.

2.9.2 RF Safety for Installation and Maintenance Personnel

It is important that all personnel working with the installation and maintenance of transmitting equipment and antennas have basic knowledge regarding RF safety. They must have been informed or trained to be observant of potential risks of RF exposure exceeding specified safety limits, and be aware of precautionary measures necessary for differing situations.

Caution!

Do not stand or work in front of an operational antenna, unless it has been verified or documented that RF exposure levels are within specified safety limits.

Caution!

Always be aware of other RF transmission antennas located close to the antenna you will be working with. If the RF exposure level is unknown, contact the equipment operator or ensure that measurements are done to verify that levels are below specified safety limits before starting work.

Caution!

Broken or disconnected RF cables can lead to exposure levels reaching, or exceeding, specified safety limits. Repair or reconnect cables before starting work.

Note: Working outside of the main transmission direction of ordinarily configured antennas is in most situations possible, since the RF exposure does not normally reach specified safety limits in these directions.

2.10 Laser Hazards

This section provides information on working with products that have devices that communicate through optical fibres using laser.

Note: This information only applies to products marked with the laser hazard symbol, stating the class of laser in use.

2.10.1 Class 1 Laser

This section provides information on working with equipment containing Class 1 laser.

Products containing a Class 1 laser, according to IEC/EN 60825, are safe to use and therefore have no requirements for cautions or warnings during operation or maintenance procedures.

2.10.2 Class 3 Laser

This section provides information on working with equipment containing Class 3 laser.

Danger!

Never look directly into the end of a fiber optic cable, or other laser source. Equipment that transmits laser light can cause permanent eye damage. Switch off the laser before starting work on laser equipment.

Safety Precautions for Working with Class 3 Laser

The following precautions must be observed when working with products containing a Class 3 laser hazard symbol:

- Never look into the light emitting end of a functioning optical fibre.
- Switch off units producing the laser signal before disconnecting an optical fibre.

2.11 Chemical Hazards

This section provides information on chemical hazards that can be present in products.

2.11.1 Beryllium Oxide Hazard

This section provides information on Beryllium Oxide (BeO). BeO is a restricted substance that is contained in certain components in some Ericsson products. If a product contains BeO, this is clearly marked on the unit containing BeO. The BeO hazard symbol is shown in the figure below.

Figure 12 BeO Hazard Symbol

Note: This information only applies to products marked with the BeO symbol.

Danger!

This product contains Beryllium Oxide (BeO), which can cause injury to skin or mucous membranes severe enough to endanger life or cause permanent injury. BeO dust is created by chafing, filing, or breakage and is extremely dangerous if inhaled, even for only a few seconds. Particles penetrating the skin through wounds or abrasions are liable to cause chronic ulcerations. Do not handle components containing BeO without protection.

Symptoms of BeO Poisoning

Symptoms of BeO poisoning are respiratory distress, cyanosis (grey-blue discoloration of the skin and mucous membranes), or both. These symptoms may develop within a week, or after a period of several years.

Safety Precautions for Working with Components Containing BeO

The following precautions must be observed when working with components containing BeO:

- Do not carry loose components in pockets, bags, or containers, or tamper with them in any way that could cause breakage or disintegration.
- Do not apply excessive heat during soldering.
- Do not break open components for inspection.
- Store components in their original packaging and do not mix them with other components.
- Ensure that components do not become mechanically damaged.
- Use care when replacing defective components.
- Do not blow on exposed surfaces due to the danger of BeO dust.
- In case of accident, or if you feel unwell, seek medical advice immediately and show the label where possible.

2.11.2 Battery Acid Hazard

This section provides information on chemical hazards related to lead-acid batteries.

Caution!

Excessive heat can cause battery casing to soften and warp, potentially allowing acid to escape. In contact with the skin, acid can cause injury, and if breathed in, can affect the airways. Use protective equipment when replacing batteries.

Caution!

Batteries can leak electrolyte if improperly handled. Electrolyte in contact with skin or eyes can cause injury. In the event of electrolyte injuries, rinse the affected area with water and seek medical attention immediately. Use protective equipment when replacing batteries.

Safety Precautions for Working with Lead-acid Batteries

The following precautions must be observed when working with lead-acid batteries:

- Eye wash facilities, and protective gloves or aprons are available.

2.11.3 Gas Explosion Hazard

Open-cell lead acid batteries can give off gases that in the event of a fire can cause an explosion that is likely to be fatal. All battery areas must be adequately ventilated and protected from fire.

Danger!

Do not use open-cell lead acid batteries. Open-cell lead acid batteries give off hazardous gases that, if ignited, can cause an explosion that is likely to be fatal.

2.12 Other Hazards

This section includes safety instructions and rules for the following hazards:

- Handling Heavy Goods

- Working at Height

2.12.1 Handling Heavy Goods

This section provides instructions and rules for handling heavy goods.

Note: Follow local regulations for safety clothing and safety equipment for hoisting and moving goods.

Falling Objects

Warning!

Risk for falling objects, work at height in progress. Falling objects can cause serious injury or even be fatal. Always wear a helmet and avoid standing in the danger area.

Overloading

Warning!

Overloading, or other wrong use of lifting devices, can cause serious injury to anyone hit by falling equipment. Do not create an angle exceeding 90° between lifting straps as this increases the strain on them and can cause them to snap.

Caution!

The equipment is heavy. Lifting the equipment without the aid of a lifting device can cause injury.

Unsecured Equipment

Caution!

Tip risk! Unsecured equipment can tip over if not secured properly, causing injury to personnel. Secure products with a high center of gravity as soon as possible to avoid accidents.

2.12.2 Working at Height

This section provides information about working at height.

For information on climbing instructions for working at height, see:

Safe Climbing *LZY 213 715/02*

Safety Precautions for Working at Height

The following precautions must be observed when working at height:

- Personnel have the appropriate training and medical certificate.
- A full-body safety harness and safety helmet are available.
- Adequate protective clothing, essential in cold and wet weather, is available.
- All lifting devices are tested and approved, and ready for use.
- All personnel in the area are wearing helmets.

3 System Safety Information

3.1 Introduction

This document presents the system used for presenting system safety information for Ericsson products. The instructions included are mandatory to ensure product safety while working with Ericsson products.

Local regulations must be taken into consideration. The system safety information in this document is in addition to local regulations.

Note: Reduce the risk of accidents by studying all the instructions carefully before starting work. If questions arise regarding the safety instructions, contact the supervisor or the local Ericsson company for clarification.

For information on personal health and safety for Ericsson system products, see:

Personal Health and Safety Information, Ericsson System Products	*124 46–2885*

Local Regulations

Local regulations, first and foremost national regulations, override the information in this document. Where applicable local regulations are not available, the information herein prevails.

Product Exclusion Indication

The information in this document covers system safety information for all Ericsson system products. As all the information does not apply to a specific product, the readers must familiarize themselves with the potential hazards indicated on the product they are working with to understand which document parts apply to their product.

3.1.1 Target Group

The target group for this system safety information is personnel who work with Ericsson products. All personnel who work with engineering, installation, test, and operation and maintenance of Ericsson products must familiarize themselves with this information.

3.1.2 Educational Requirements

The product safety instructions in the relevant manuals or documents require that persons performing work on Ericsson products have the necessary education, training and competence required to perform work correctly. For certain work, additional or special training may be required, for example authorization for Authorized Service Providers (ASP). ASP is an Ericsson certification procedure.

A good understanding of technical English is required, or of the language that the information is presented in, to ensure that these instructions can be understood and complied with.

3.2 Admonitions and Safety Symbols

This section presents the types of admonitions and safety symbols used in all documents for Ericsson system products. There are two types of system safety admonitions that indicate risk to products: Do! and Stop!. When admonitions are encountered anywhere in a document, the information included should be read and any instructions should be followed.

The figures below show the symbols used to indicate product safety admonitions:

Figure 13 Do Safety Symbol

Figure 14 Stop Safety Symbol

The terms Do! and Stop! are defined below:

Do! Indicates an action that must be performed to prevent equipment damage, software corruption, data loss or service interruption.

Stop! Indicates that action must be avoided to protect equipment, software, data or service.

The term ‘‘Note’’ is used to present important information that might otherwise be overlooked.

3.2.1 Special Hazard Symbols

This section presents special hazard symbols used to indicate the risk of Electrostatic Discharge (ESD):

Figure 15 Electrostatic Discharge Hazard Symbol

3.3 Batteries

This section provides information on damage that can be caused to products containing batteries that are damaged.

3.3.1 Overheated Batteries

Caution!

Do! Check batteries for signs of overheating. The casing surrounding overheated batteries can be soft and warped. Replace damaged batteries according to instructions.

If it is suspected that batteries are overheated, check the following:

- The internal temperature of the equipment is below +60°C (140°F).
- Batteries have not leaked.

Corrective Actions

1. Replace overheated batteries.
2. Treat leakages from batteries as described in Section 3.3.2 Treating Hazardous Waste from Leaks on page 29.

3.3.2 Treating Hazardous Waste from Leaks

Caution!

Do! Check batteries for acid leakage. Acid can corrode the product. Replace leaking batteries according to instructions.

In case of spillage of hazardous substances, there should always be sufficient absorbers or neutralizing materials available on site. There is a danger of spillage occurring when installing, removing, replacing or servicing batteries. The absorbers and neutralizing materials must be suitable for the hazardous substances involved. Typical neutralizing agents are shown inTable 1 on page 30.

Table 1 Typical Neutralizers

Typical Neutralizers	Chemical Compound
Baking soda (bicarbonate)	$NaHCO_3$
Sal soda	$Na_2CO_3IOH_2O$
Soda ash	Na_2CO_3

Note: Absorbers and neutralizing products will vary, depending on the country and battery manufacturer. Consult the battery manufacturer for specific details of absorbers and neutralizing materials.

3.4 Electrical Installation

This section provides information on ensuring that AC and DC powered products are not damaged due to improper installation.

Caution!

Stop! Do not install or modify AC or DC powered equipment unless you are a qualified and authorized electrician. Improper installation work can seriously damage the equipment.

3.4.1 Safety Precautions for Working with Electrical Installations

The following precautions must be observed when working with electrical installations:

1. Ensure that approved circuit breakers or fuses are installed.
2. Ensure that the cables used have a sufficient cross-sectional area in accordance with product requirements and local laws and regulations.
3. Ensure that conductors are connected according to the connection diagram.
4. Label the cables correctly.
5. Check the installation work upon completion.

3.5 Electrostatic Discharge

This section provides information and instructions on Electrostatic Discharge (ESD) product safety. ESD is defined below.

ESD A static electric charge accumulates when a body rubs against clothes, slides against a chair, when shoes rub against a floor, or when ordinary plastics are handled, and so on. The electrostatic charge can remain for a considerable length of time and is discharged when the body comes into contact with conductive material.

An ESD wrist strap must be used when working with ESD sensitive components, even in equipment rooms fitted with ESD protective floor covering. Although ESD floor covering reduces the risk of ESD, if the wrong type of shoes are used, or if the person is already charged when they enter the room, the floor covering in itself does not protect from this, and therefore an ESD wrist strap must be used.

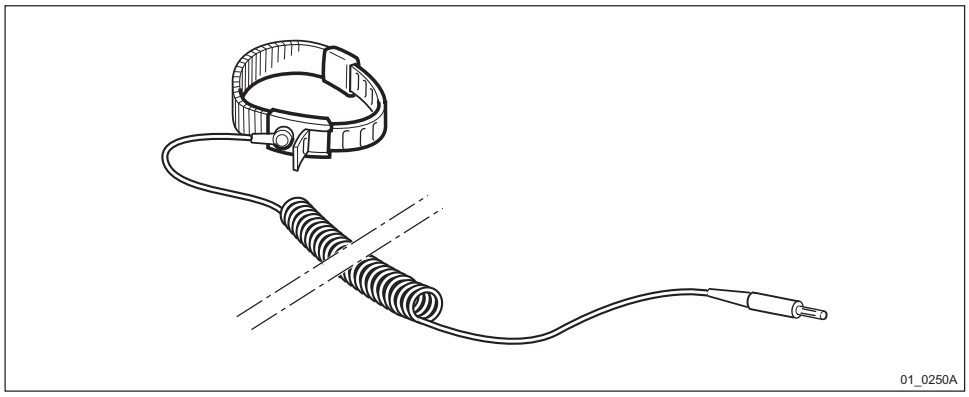


Figure 16 ESD wrist strap

The ESD wrist strap contains a resistor with resistance greater than 1 MΩ in the cable to protect the operator. The resistance value is low enough to discharge the electrostatic voltage. The ESD wrist strap must be connected to ground.

Instructions for ESD Wrist Strap Use

1. Place the ESD wrist strap around your wrist and insert the connector at the other end to the ground (earth) terminal on the equipment.

2. Always use the wrist strap when and where its use is required.

Note: Test the ESD wrist strap regularly.

3.5.1 Handling Printed Board Assemblies and IC Components

Note: Treating all components as if they are ESD sensitive, whether they have IC components or not, reduces the risk for ESD and significantly reduces the operating time between failure.

Caution!

Stop! This product contains components sensitive to ESD. Use an approved ESD wrist strap, connected to the product grounding point, to avoid damaging these components.

Caution!

Do! Always use an approved ESD wrist strap when working with sensitive equipment. Damage to components mounted on printed board assemblies can occur if an ESD wrist strap is not used.

3.5.2 Storing and Transporting Printed Board Assemblies and IC Components

When storing or transporting printed board assemblies or IC components, ensure one of the following:

- The item is stored or transported in its original packaging, or in other anti-ESD material.
- The item is stored or transported in a conductive material, or a special IC carrier that either short-circuits or insulates all leads of the components.

3.6 Equipment Handling

This section provides information on how to avoid damage to products when handling them.

Caution!

Do!

Tip risk! This equipment has a high center of gravity without all units installed. Secure the equipment before opening the door.

Caution!

Stop! Never lift a unit by the cables as this can damage the equipment.

3.7 Ground Connection

This section provides information on product grounding (earthing) safety.

Note: The terms "grounding" and "earthing" are synonyms.

Caution!

Do! Products not connected to ground risk being damaged by overvoltage or overcurrent. Always connect products to ground according to instructions.

3.8 Lightning Protection

This section provides information on protecting products from damage due to lightning where a lightning protection system is available.

Caution!

Do! Connect products to the lightning protection system to protect the equipment from transient surges.

4 Tools and Instruments

This section contains lists of all tools and instruments recommended for the complete installation of the RBS 2308 and RBS 2309.

4.1 Tools for Installation of RBS 2308 and RBS 2309

Table 2 Basic Tools for Installation

Description	Specification
Adjustable spanner 10"	-
Drilling machine	-
Knife(1)	-
Measuring tape(1)	6 m
Pen	-
Screwdrivers(1)	Torx: T20 and T30
Screwdrivers	3 mm and 5.5 mm
Side cutting pliers(1)	-
Snip nose pliers	-
Socket set(1)	10 – 19 mm
Spirit level(1)	-
Torque wrench	5 – 25 Nm
U wrenches(1)	13 mm, 16 mm, 17 mm, 20 mm and 22 mm
Wire stripper(1)	0.2 – 6 mm^2

(1) Included in Personal Tool Set, Product Number LTT 601 135/1.

Table 3 Special Tools for Installation

Description	Specification	Product Number
Crimping tool set	for grounding	LTT 601 86
Torque wrench	for N connector	LSS 103 25/1
Torque wrench	for TNC connector	LTT 601 93

4.1.1 Documentation

The following documents are required for the installation procedure:

- Completed and approved record prepared during site preparation
- Site Installation Documentation (prepared by the Installation Engineering department)

Standard Site Material Installation Instructions *EN/LZT 720 0014*

4.2 Equipment for Antenna System Tests

Table 4 Test Equipment for Antenna System Tests

Description	Specification	Product Number
Antenna Tester Set	Anritsu Site Master S331C	LPK 102 101/8

The Anritsu Site Master S331C is recommended for the Antenna System Tests, but the following Site Master models can still be used if available: S251A/B and S331A/B for GSM 800/900/1800/1900 antenna systems.

4.2.1 Documentation

The following documents are required for the antenna system tests:

- Site Installation Documentation
- A test record

For more detailed information on the Anritsu Site Master, see:

Anritsu Site Master User's Guide (included in Antenna Tester Set)

Note: Instructions for Site Master models S251A/B and S331A/B for GSM 800/900/1800/1900 antenna systems are not included in this document. When using any of these models ensure that all necessary accessories are included. See:

Standard Tools and Equipment Catalogue *LZT 720 0013*

4.3 Equipment for Site Installation Tests

Table 5 Test Equipment for Site Installation Tests

Description	Specification	Product Number
Fluke 79 III	Multimeter	LPK 102 024/3
OMT Kit	OMT Kit and SW cable	NTM 201 2289/15
Torx T20(1)	Torx screwdriver	-

(1) Included in Personal Tool Set, product number LTT 601 135/1.

4.3.1 Documentation

The following documents are required for the site installation tests:

- A completed test record from antenna system tests
- A test record for site installation tests

OMT User's Manual (included in OMT Kit) *EN/LZN 720 0001*

4.4 Equipment for RBS Site Integration

Table 6 Test Equipment for RBS Site Integration

Description	Specification	Product Number
Loop forward/ backward board	Transmission test board	LPY 107 757/1
TEMS Kit	GSM 800/1900	FAB 801 2524
TEMS Kit	GSM 900/1800/1900	FAB 801 2523

4.4.1 Documentation

The following document is required for the RBS site integration:

TEMS Investigation GSM Manual (included in TEMS Kit) *LZT 108 2684*

4.5 Equipment for Maintenance

Table 7 Basic Tools for Maintenance

Description	Specification
Adjustable spanner 10"	-
Knife(1)	-
Screwdrivers(1)	Torx: T20 and T30
Screwdrivers	3 mm and 5.5 mm
Side cutting pliers(1)	-
Snip nose pliers	-
Socket set(1)	-
Torque wrench(1)	5-25 Nm
U wrenches(1)	13 mm, 16 mm and 17 mm, 20 mm and 22 mm
Wire stripper(1)	0.2-6 mm^2

(1) Included in Personal Tool Kit, product number LTT 601 135/1.

Table 8 Special Tools for Maintenance

Description	Specification	Product Number
Fluke 79 III	Multimeter	LPK 102 024/3
OMT Kit	-	NTM 201 2289/15
Torque wrench	for N connectors	LSS 103 25/1
Torque wrench	for TNC connectors	LTT 601 93

4.5.1 Documentation

The following documents are required for the maintenance work:

OMT User's Manual (included in OMT Kit) *EN/LZN 720 0001*

RBS 2308, RBS 2309, RBS 2109 and EBB-06 Hardware Reference Manual *EN/LZT 720 0058*

4.6 Kit Specifications

For a specification of all required kits, see:

Standard Tools and Equipment Catalogue *EN/LZT 720 0013*

5 Installation of RBS

5.1 Introduction

This document describes how to install the RBS 2308 and RBS 2309.

Target Group

The target group for this instruction is personnel involved in the installation of an RBS.

5.2 Preconditions

This section provides preconditions that must be met before starting the installation work.

Note: Specific preconditions exist for wall and pole mounting.

Documentation

This section presents additional documents required for the installation procedure.

Ensure that the following documents are available:

- Completed and approved record prepared during site preparation
- Site Installation Documentation (prepared by the Installation Engineering department)

Standard Site Material Installation Instructions EN/LZT 720 0014

General Preconditions

Before starting site work, ensure the following:

- Site access permission received
- Ordered RBS, equipment, specified tools and other necessary facilities have been delivered
- Site power is available
- Site Grounding Point is available

Note: The terms earthing and grounding are synonymous.

- Transmission line from the BSC is available
- During outdoor installation, protection for the RBS is available in case of bad weather

Note: After installation, if the surrounding temperature changes between hot and cold, then to avoid humidity damage the RBS must not be left without power for more than 48 hours.

To switch on the RBS, *see Chapter Site Installation Tests*:

If any of the above preconditions cannot be complied with, then contact the site supervisor or person responsible for the activity that has been missed.

Additional Preconditions for Wall-Mounted RBS

Before installing the RBS on a wall, ensure that the following preconditions are met:

- The type of fasteners are suitable for the kind of wall material on which the RBS is to be mounted
- The contact surfaces on the Mounting Base Unit (MBU) are supported by the wall. If not, then a wall bracket is required

If any of the above preconditions cannot be complied with, then contact the site supervisor or person responsible for activity that has been missed.

Additional Preconditions for Pole-Mounted RBS

Before installing the RBS on a pole, ensure that the following preconditions are met:

- The pole must have the required diameter 60 – 114 mm
- A wall bracket is available
- A mast fixture set is available

If any of the above preconditions cannot be complied with, then contact the site supervisor or person responsible for activity that has been missed.

5.3 Torque Settings

This section presents the recommended torque values to be used when installing the RBS.

The tools needed for the installation are found in *Chapter Tools and Instruments*.

Table 9 Recommended Torque

Dimension	Torque				Notes
	Ncm	**Nm**	**lbf-in**	**lbf-ft**	
M3	110 +/- 7	-	9.7 +/- 0.6	-	-
M3	80 +/- 7	-	7.1 +/- 0.6	-	Reduced torque for plastic covers
M4	260+/- 15	-	23.1 +/- 1.3	-	-
M4	170 +/- 15	-	15.1 +/- 1.3	-	Reduced torque for captive screws
M6	-	8.8 +/- 0.5	-	6.5 +/- 0.4	-
M8	-	21 +/- 1.3	-	15.5 +/- 1	-
M10	-	41 +/- 2.5	-	30.2 +/- 1.8	-

5.4 Installation Procedure

This section describes the installation procedure for the RBS.

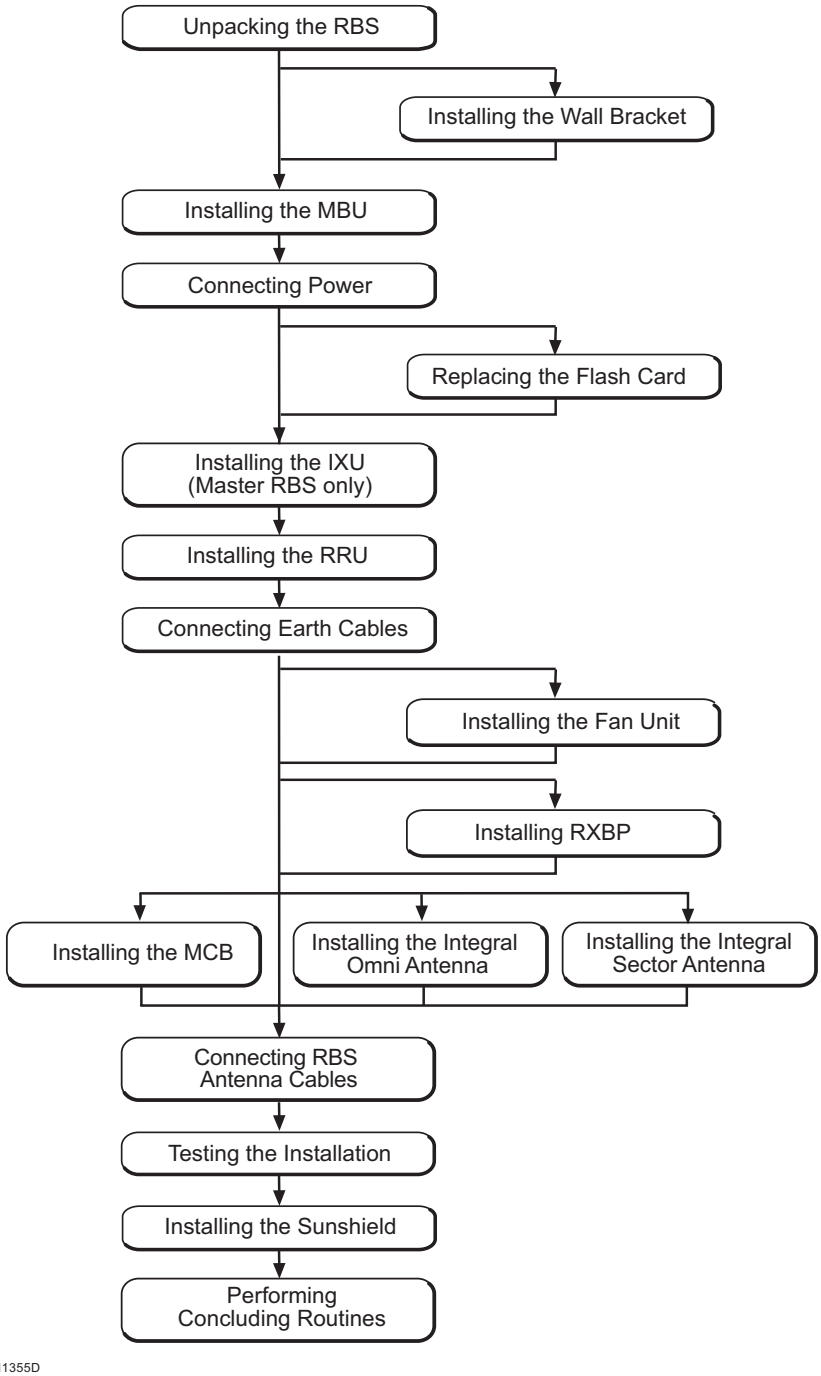


Figure 17 The RBS Installation Process

5.4.1 Unpacking RBS

Unpack the RBS on-site. To avoid damage, the RBS should *not* be unpacked elsewhere and then transported to site.

Caution!

Stop! This product contains components sensitive to ESD. Use an approved ESD wrist strap, connected to the product grounding point, to avoid damaging these components.

In order to avoid damage to components due to electrostatic discharges during unpacking, personnel must not come in contact with the connectors of the RBS.

Ensure that the correct material has been delivered. If the material is damaged, complain immediately to the supervisor or the transport company.

5.4.2 Installing the Wall Bracket

Note: This section is only applicable for walls with very rough surfaces or when the RBS is to be mounted on a pole.

This section describes how to install the wall bracket.

The wall bracket is for use as a complement to the mounting interface of the Mounting Base Unit (MBU). Typical applications are rough surfaces and other conditions where the mounting interface for the MBU is not flat. The plate must also be used if the RBS is to be installed on a pole. *See applicable section below.*

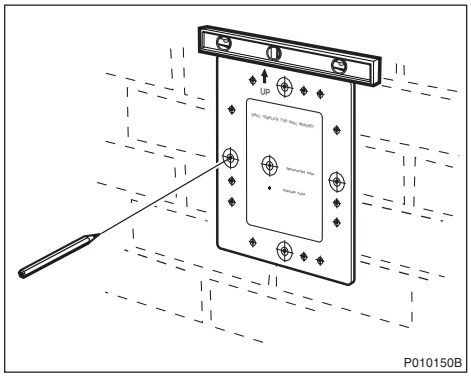
5.4.2.1 Installing the Wall Bracket on a Wall (Alternative)

1 Place the drilling template in the position where the RBS is to be located.

2 Use a spirit level to check that the drilling template is horizontal.

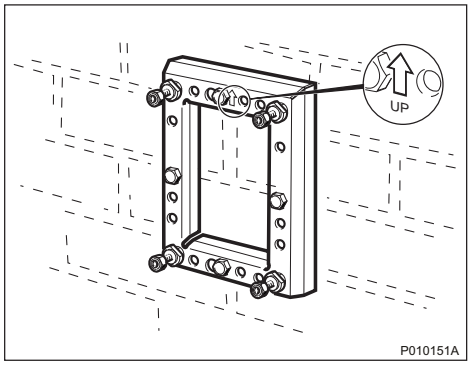
3 Mark the position of the holes to be drilled.

Note: The wall bracket must not be used as a drilling template, to avoid damaging the rust protection surface.



4 Remove the template and drill the holes for the fasteners.

5 Install the wall bracket and secure it in position with all the screws provided.



6 Loosen the four nuts, on which the MBU is to be hung, until only a few threads remain exposed.

5.4.2.2 Installing the Wall Bracket on a Pole (Alternative)

1. Choose the appropriate holes. *See Figure below.*

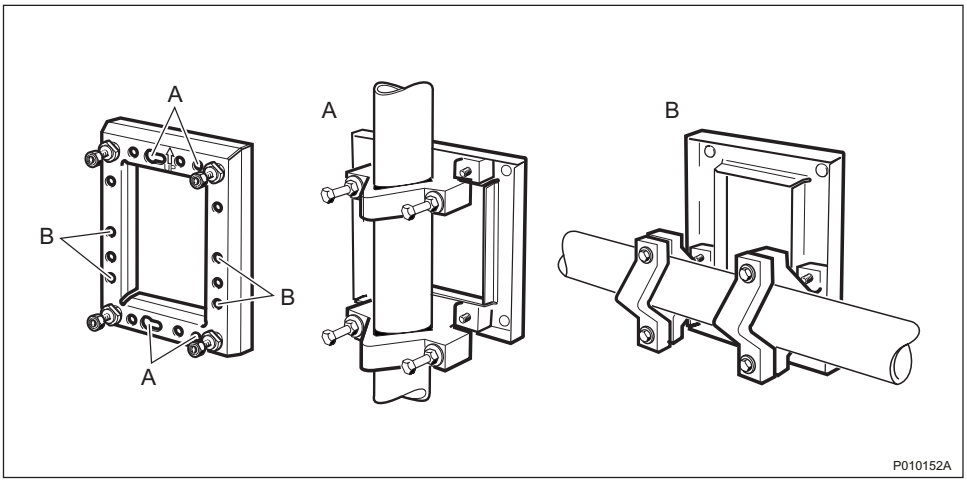


Figure 18 Installation Alternatives

A Holes used for vertical poles

B Holes used for horizontal poles

2. Ensure that the washers are mounted correctly and attach the two clamps with the screws and washers. *See Figure below*.

   Note: Ensure that the recess is attached in the correct direction.

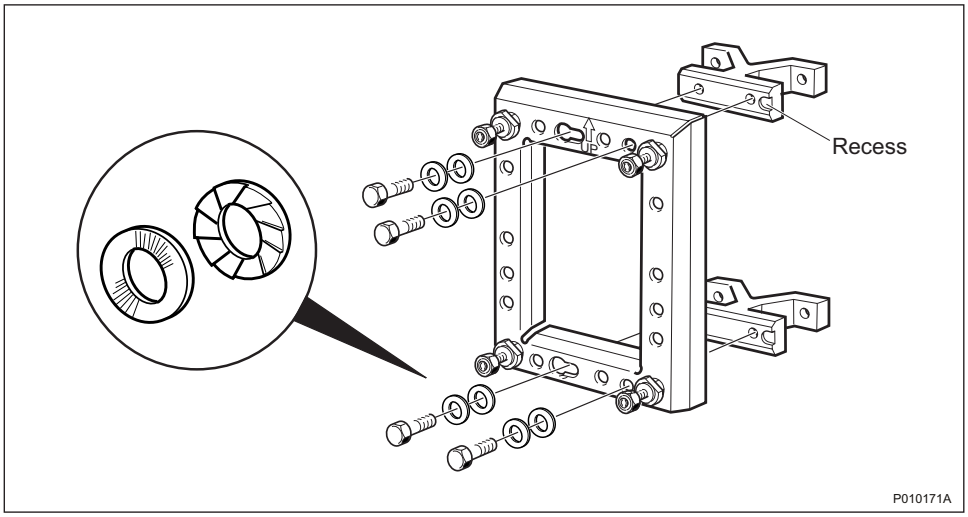


Figure 19 Fastening Clamps to the Wall Bracket

3. Position the wall bracket on the pole and mount the clamps, tightening the screws alternately to avoid bending them. Ensure that the washers are mounted correctly.

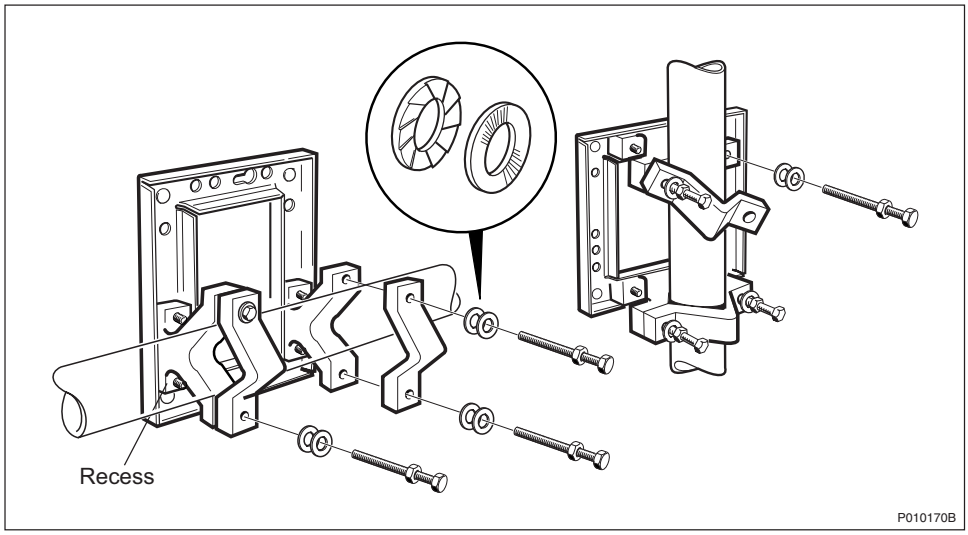


Figure 20 Installing the Wall Bracket on the Pole

5.4.3 Installing the MBU

This section describes how to install the Mounting Base Unit (MBU) on a wall or wall bracket.

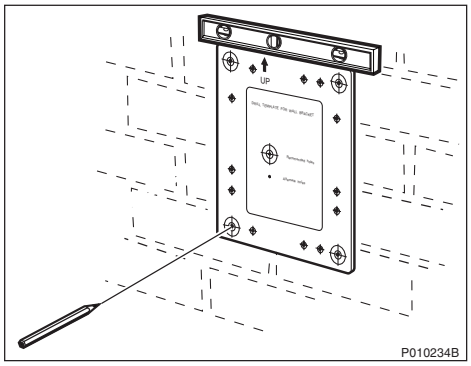
5.4.3.1 Installing the MBU on a Wall

1 Place the drilling template in the position where the RBS is to be situated.

2 Use a spirit level to check that the drilling template is horizontal.

3 Mark the position of the applicable holes to be drilled.

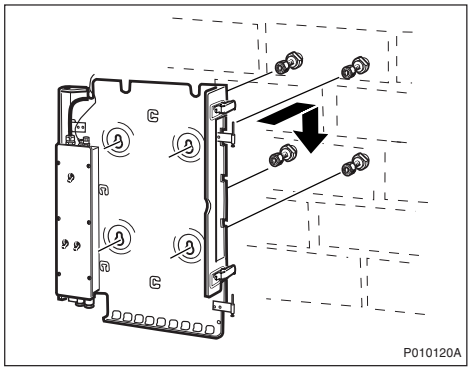
Note: To avoid damaging the rust protection surface, the MBU must not be used as a drilling template.



4 Remove the template and drill holes for the fasteners most suitable for the wall material.

5 Insert the fasteners and tighten them, remembering to leave enough threads protruding to hang the MBU on.

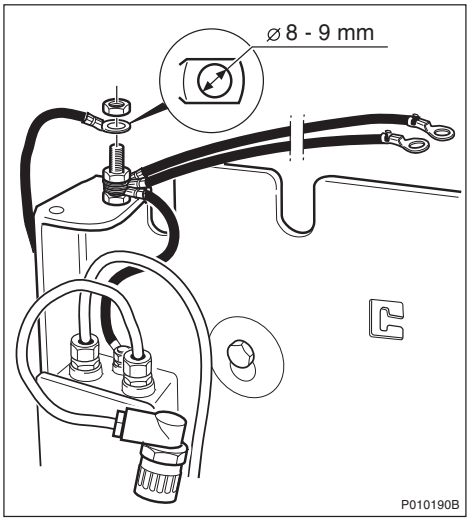
6 Hang the MBU on the bolts, applying just enough downward pressure to ensure that the screws fit in the keyholes.



7 Tighten the four bolts.

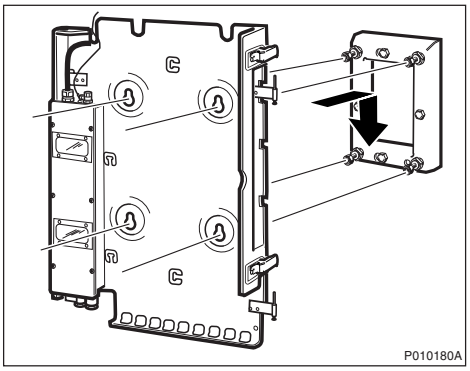
8 Connect site earthing to the MBU.

Note: In configurations with more than one RRU and a 2-wire DC Supply, an extra earthing cable must be connected between the RBSs.



5.4.3.2 Installing the MBU on a Wall Bracket

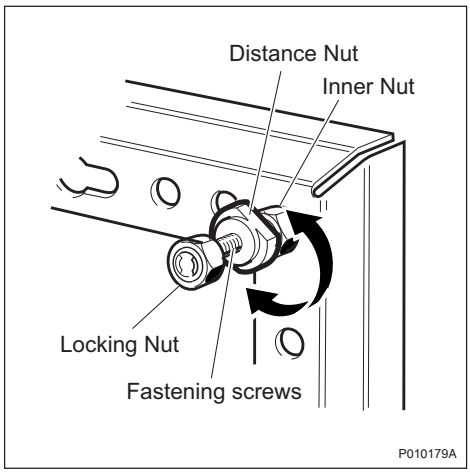
1 Install the MBU on the four screws situated on the wall bracket. Ensure that the fastening screws are properly fitted in the key holes.



2 Use a spirit level to check that the MBU is positioned vertically.

3 If the MBU is not in a vertical position the then inclination can be corrected by adjusting the four distance nuts on the wall bracket. To do this, the MBU must be removed. Leave the locking nuts on the fastening screws.

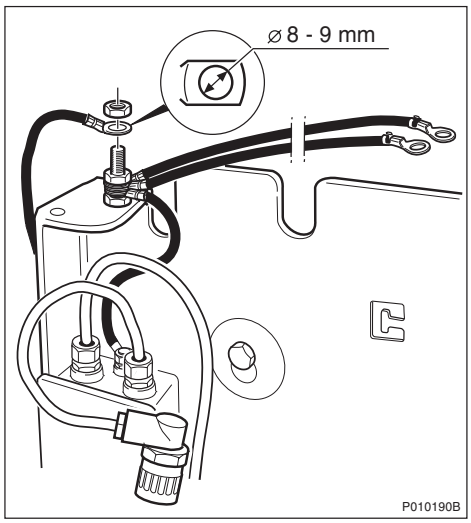
Note: Do not loosen the inner nuts. The inner nuts secure the fastening screws to the wall bracket.



4 When the wall bracket is correctly adjusted, put back the MBU and tighten the four locking nuts.

5 Connect site earthing to the MBU.

Note: In configurations with more than one RRU and a 2-wire DC Supply, an extra earthing cable must be connected between the RBSs.



5.4.4 Connecting Power

This section describes how to connect the power cable(s) to the RBS. The section includes instructions for both AC and DC cables.

Danger!

Electric shock risk. Avoid both direct and indirect contact with parts connected to mains power as this is likely to be fatal. Switch off the mains power before starting work.

Danger!

Improper electrical installation may cause fire or electric shock that is likely to be fatal. Only a qualified and authorized electrician is permitted to install or modify electrical installations.

Note: Protective Earth must be connected to the earth terminal when connecting power supply.

The Protective Earth terminal is located in the MBU, indicated by the earth symbol, *see the Figure below*.

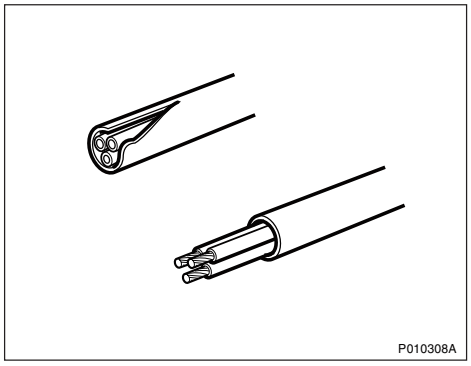
Figure 21 Protective Earth

Note: Protective Earth connection is essential.

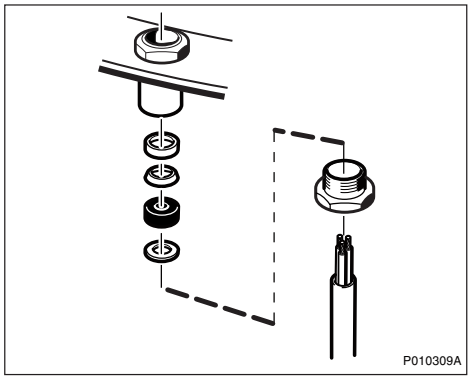
1 Remove the MBU cover from the MBU.

2 Cut the cable to the appropriate length.

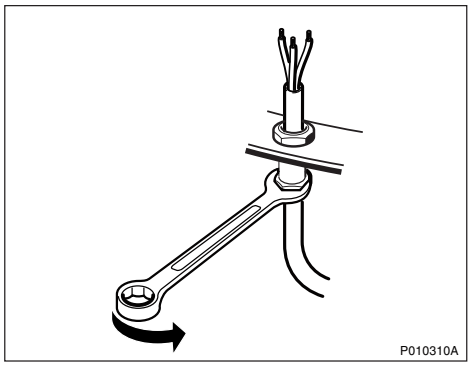
3 Remove the cable insulation and strip the conductors.



4 Mount all cable inlet parts.



5 Route the cable into the inlet and tighten the cable gland.

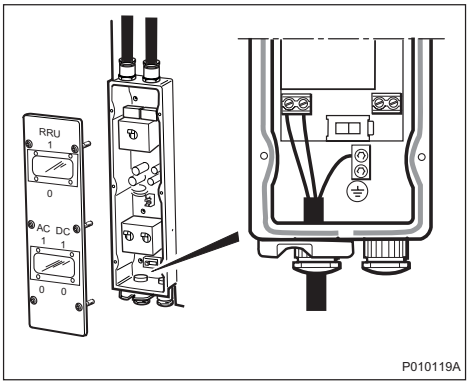


5.4.4.1 Connecting AC Mains

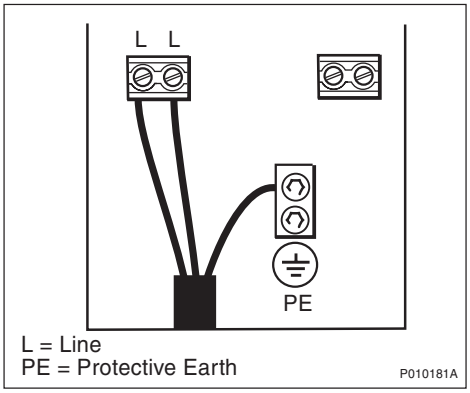
This section describes how to connect AC Mains cable (if applicable).

1 Ensure that the site power is turned off.

2 Connect the AC cable to the dedicated terminals.



3 Ensure that the protective earth is properly connected.



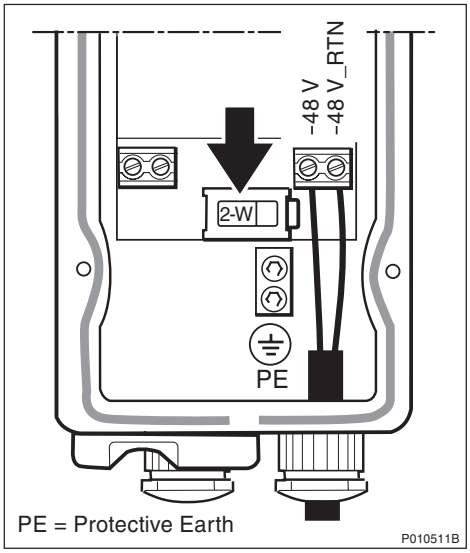
4 If DC is not to be connected, put back the MBU cover onto the MBU.

5.4.4.2 Connecting DC Supply

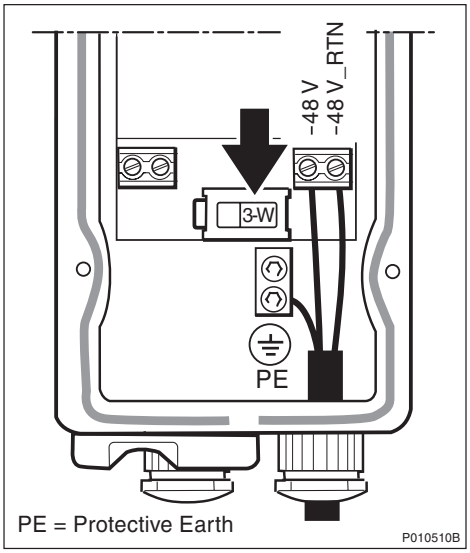
This section describes how to connect the DC supply cable (if applicable).

1 Ensure that the site power is turned off.

2 Connect the DC cable to the dedicated terminals. If 2-wire is used, set the ground selector to 2-W.



3 If 3-wire is used, set the ground selector to 3-W.



4 Ensure that the protective earth is properly connected.

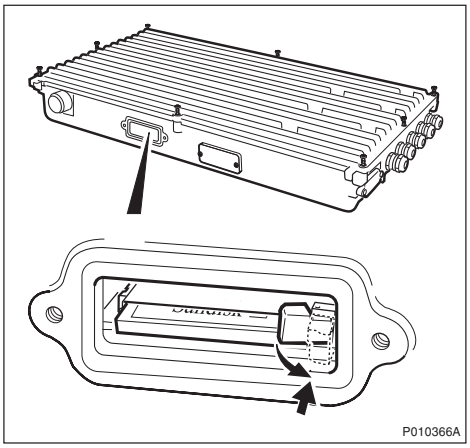
5 Put back the MBU cover.

5.4.5 Replacing the Flash Card (Optional)

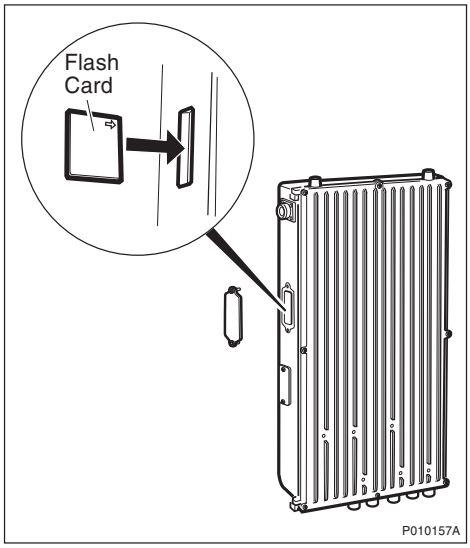
This section describes how to replace the existing flash card in the IXU. This is done only if a flash card, preloaded with site specific data, is provided.

For information about preloading the flash card, *see Chapter Maintenance*.

1 Remove the cover. Remove the existing flash card by pulling up the adjacent black plastic lever and then pushing it down to eject the card.



2 Insert the new flash card, push it in, and reset the release lever (ensuring that the card is in position).



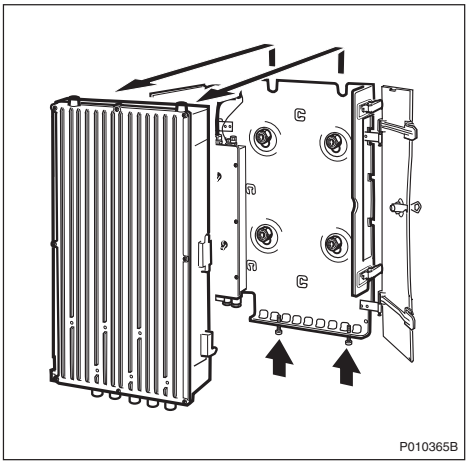
3 Put back the cover.

5.4.6 Installing the IXU (Master RBS Only)

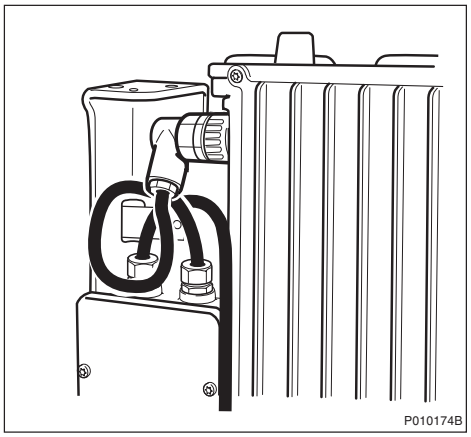
This section describes how to install the Interface and Switching Unit (IXU) on the MBU.

Note: This section is valid only for the master RBS. IXU is not used in extension RBSs.

1. Hook the IXU onto the MBU, and secure it with the two screws under the MBU.

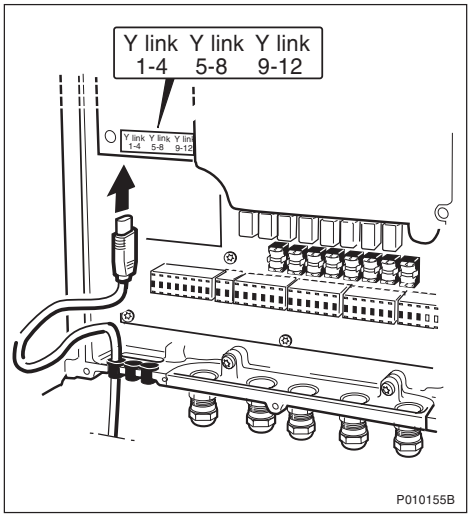


2. Connect the IXU AC/DC cable.



3. Loosen the eight screws on the IXU and open the cover.

4. Connect the Y link cable to the applicable connection port on the IXU, *see Table below*.



Note: Dummy plugs must be inserted in the unused cable inlets.

Table 10 Y link Connection Port

RBS	Connection Port
RRU 1	Y link 1 – 4
RRU 2	Y link 5 – 8
RRU 3	Y link 9 – 12

Connecting External Cables

This section describes how to connect different external equipment, for example MINI LINK™ or transmission, *see Figure below*.

Note: To simplify the cable connections, the connection frame on the IXU can be removed.

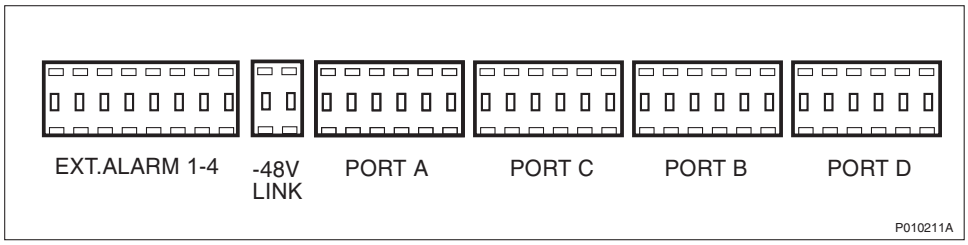
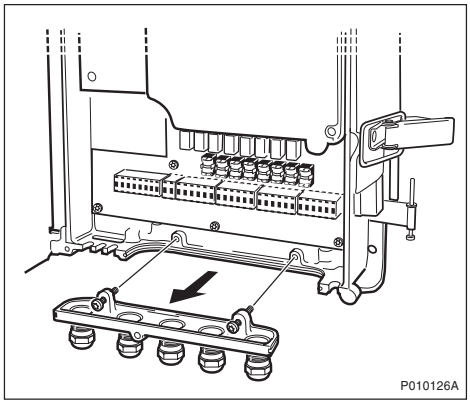
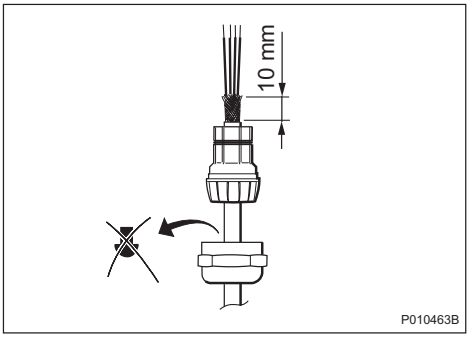


Figure 22 Connection Ports on the IXU

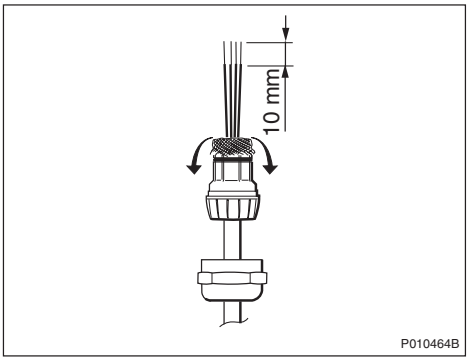
1 Remove the connection frame from the IXU.



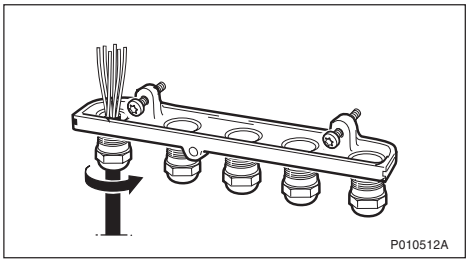
2 Remove the cable gland parts and remove the sealing insert. Route the cable through the cable gland parts and strip the cable insulation. Cut the cable screen according to the figure.



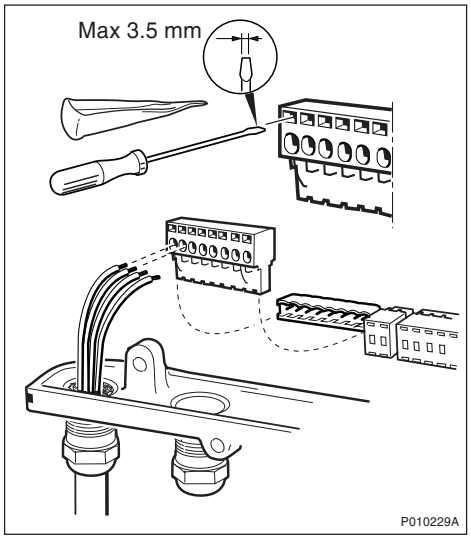
3 Strip the conductors and fold back the cable screen over the inner part of the cable gland.



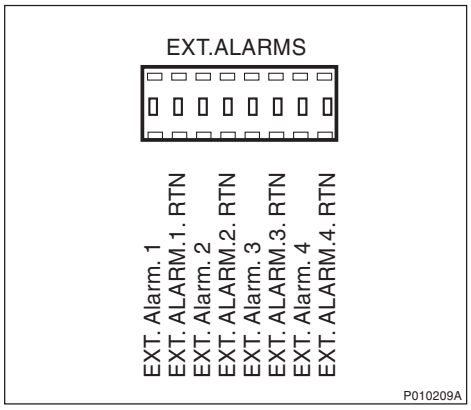
4 Insert the cable into the most suitable inlet and tighten the cable gland.



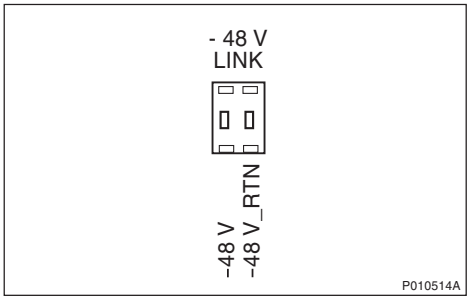
5 Strip the conductors and loosen the termination blocks. Fasten the conductors by inserting a screwdriver in the upper slot.



6 If applicable, connect the external alarm cables. *See also Figure 22 on page 58.*

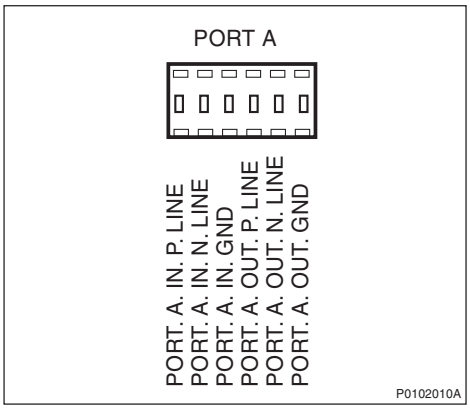


7 If applicable, connect the -48 V LINK cable. *See also Figure 22 on page 58.*



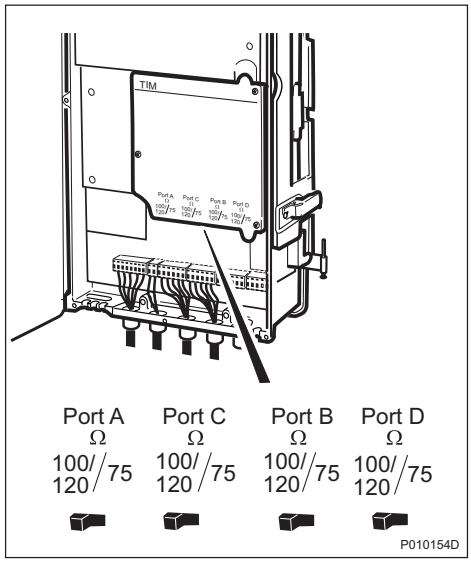
8 Connect the applicable transmission cables. The figure shows port A, but is also valid for port C, B, and D.

For information on how to connect and earth PCM lines, *see:*
- *Page 62* for 75 Ω coaxial cable
- *Page 63* for 100/120 Ω twisted pair



9 Put back the connection frame.

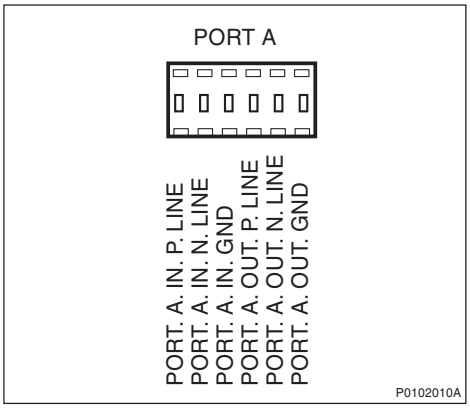
10 Select transmission impedance for each port, using the selector switches on the underside of the Transmission Interface Model (TIM).



11 Close the IXU cover and fasten the screws.

Connecting PCM Coaxial 75 Ω

1 Connect the inner conductors to P.LINE and the outer conductors to N.LINE.



2 Connect the capacitor included between IN.N.LINE and IN.GND.

3 Connect the jumper wire included between OUT.N.LINE and OUT.GND.

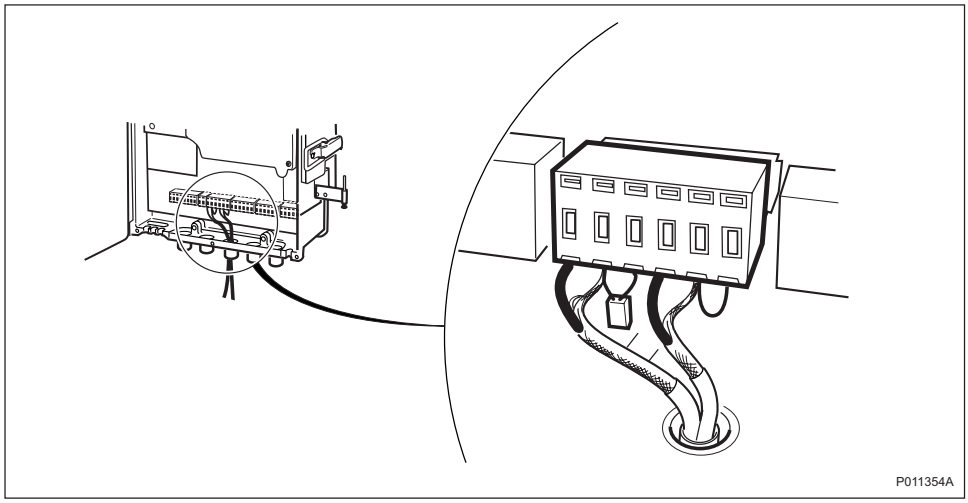
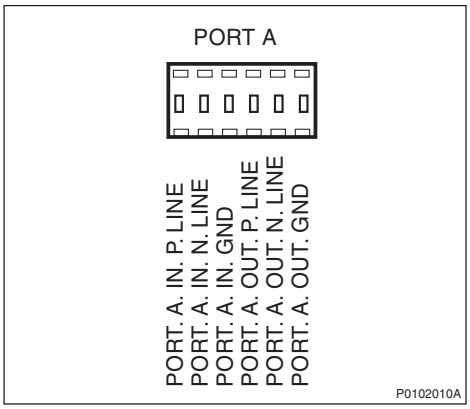


Figure 23 Connecting PCM Coaxial 75Ω

Connecting PCM Twisted Pair 100/120 Ω

1 Connect the twisted pairs to P.LINE and N.LINE.



2 Earth the cables according to the following instruction:

Inner and outer shield Connect the inner shield to the terminator block, and the outer shield to the cable gland, *see Figure 24 on page 63*.

Outer shield only Fit the shield to the cable gland, *see Figure 25 on page 64*.

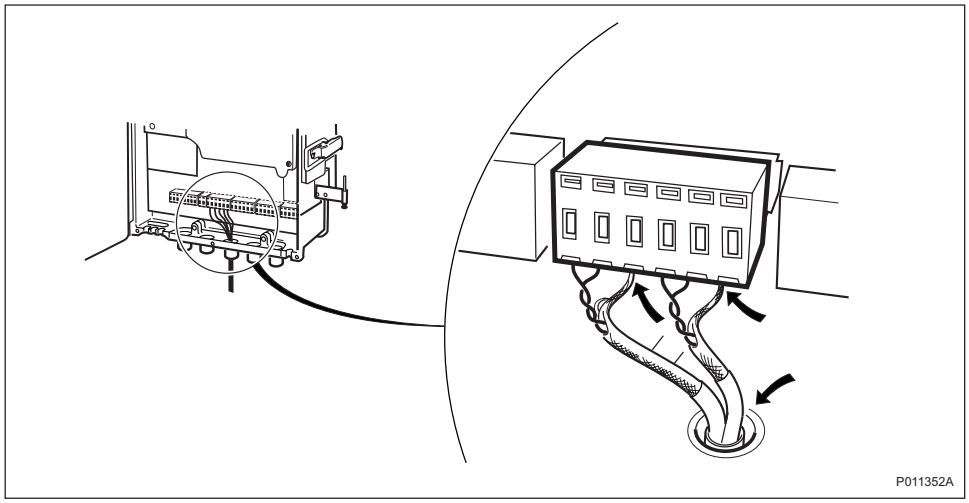


Figure 24 Earthing Inner and Outer Shield

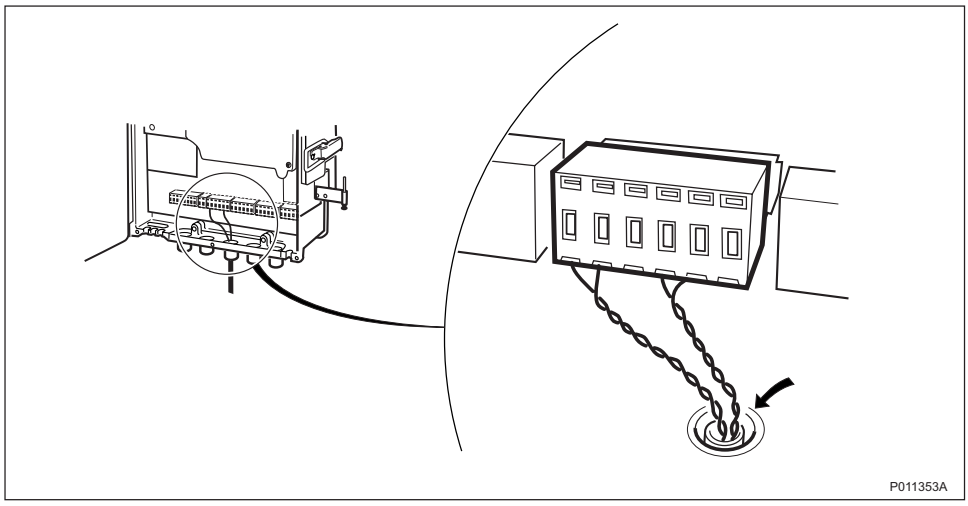


Figure 25 Earthing Outer Shield Only

5.4.7 Installing the RRU

This section describes how to install the Remote Radio Unit (RRU).

Note: To avoid damage, do not place the RRU on its connectors, *see Figure below*.

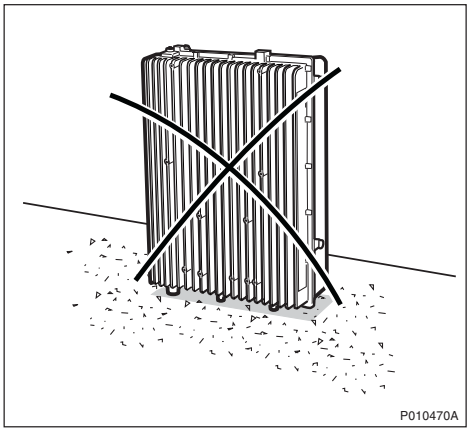


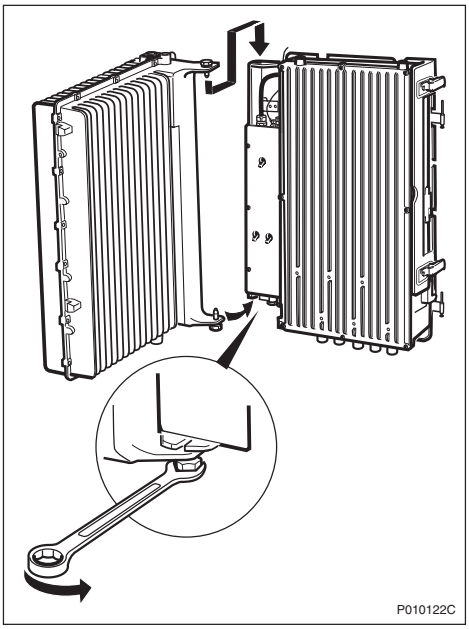
Figure 26 Do Not Place the RRU on its Connectors

Note: Do not install any equipment on the RRU before mounting it on the MBU.

Caution!

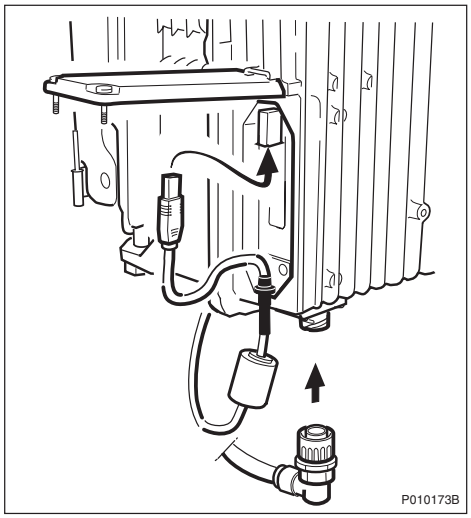
The equipment is heavy. Lifting the equipment without the aid of a lifting device can cause injury.

1 Hang the RRU onto the upper hinge. Position the lower hinge and tighten the screw.

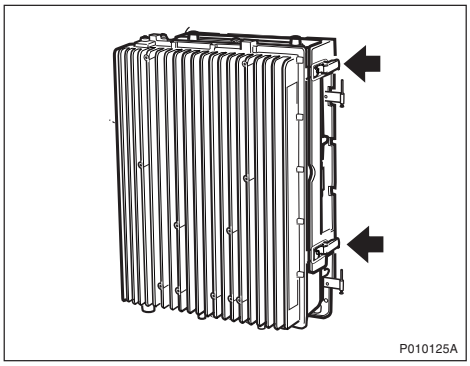


2 Remove the protection cover under the RRU.

3 Open the left side cover on the RRU, connect the Y link cabl,e and close the cover. Connect the AC/DC cable.



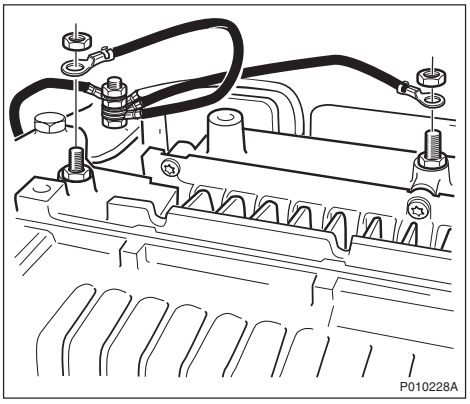
4 Close the RRU using the clasps.



5.4.8 Connecting Earth Cables

This section describes how to connect the earth cables to the RRU and the IXU.

1 Connect the earth cables from the earthing point to both IXU (master) and RRU.

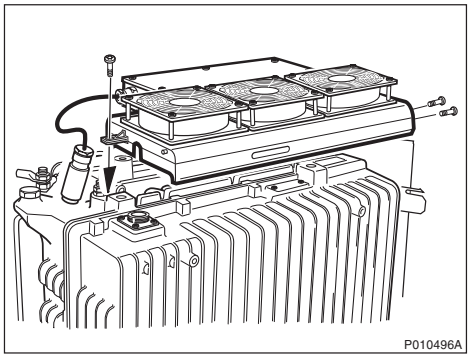


Note: If an Omni Antenna is to be installed on the RRU, the RRU earthing cable must be connected after the omni antenna bracket has been mounted.

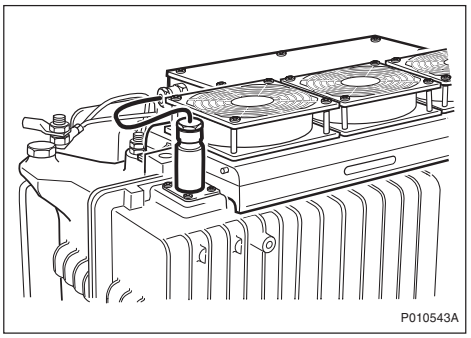
5.4.9 Installing the Fan Unit (Optional)

This section describes how to install the fan unit.

1 Install the fan on top of the RRU and fasten the three screws.



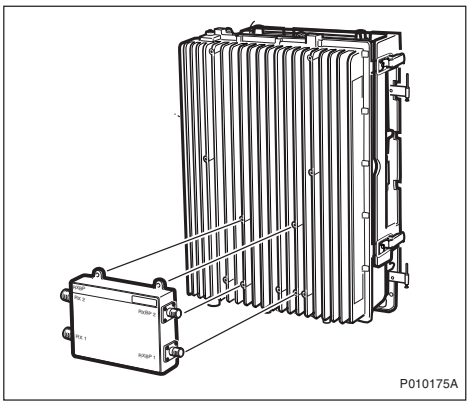
2 Connect the power cable to the RRU.



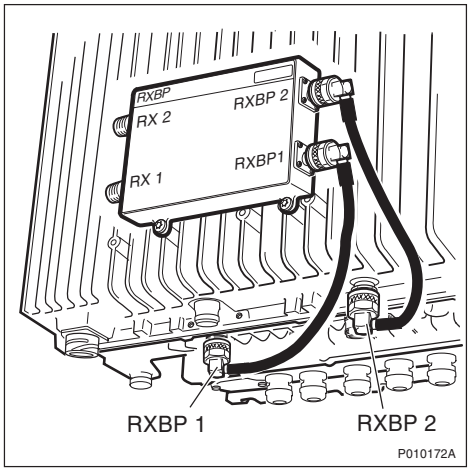
5.4.10 Installing RXBP (Optional)

This section describes how to install the Receiver Band Pass filter (RXBP) on the RRU and how to connect the cables.

1 Install the RXBP on the RRU and tighten the screws.



2 Connect the first cable from connection port **RXBP 1** on the RXBP to connection port **RXBP 1** on the RRU. Connect the other cable from connection port **RXBP 2** on the RXBP to **RXBP 2** on the RRU.



3 Connect the RX antenna cables to connection port **RX 1** and **RX 2** on the RXBP, and tighten with the appropriate torque wrench. *See Table 9 on page 43*.

For more information about antenna connections, *see*:

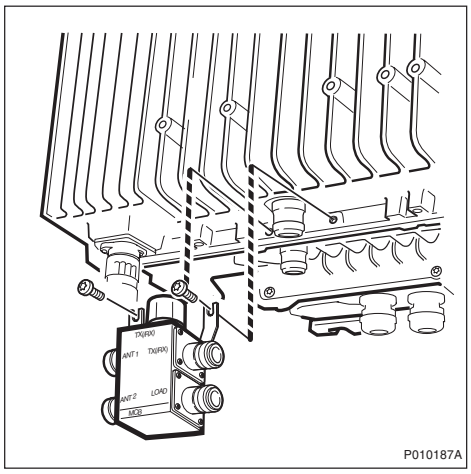
Site Installation Documentation

5.4.11 Installing the MCB (If Applicable)

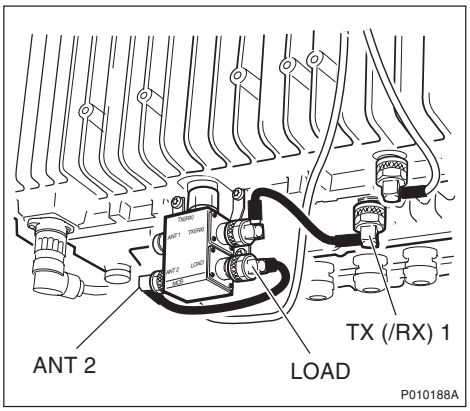
This section describes how to install the Multicasting Box (MCB) on the RRU and how to connect the cables.

5.4.11.1 Combining Function

1 Install the MCB to connector **TX(/RX) 2** on the RRU. Fasten it with the two short screws.



2 Connect the first cable between connection port **TX(/RX)** on the MCB and **TX(/RX) 1** on the RRU. Connect the second cable between connection port **ANT 2** and **LOAD** on the MCB.

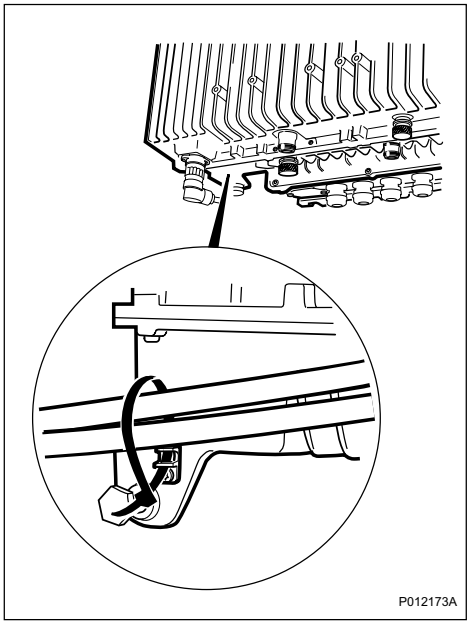


3 Connect the antenna cable to connection port **ANT 1**.

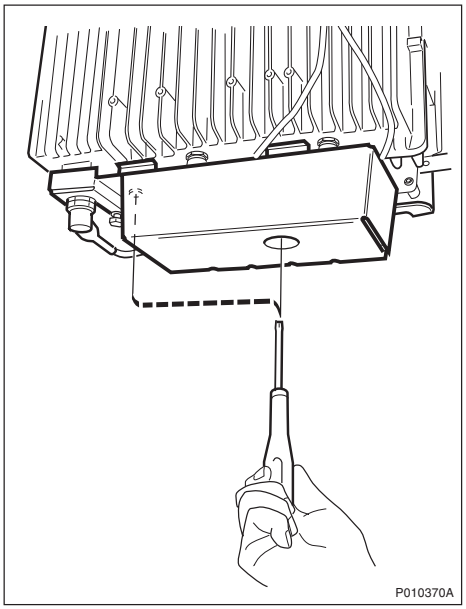
For more information about antenna connections, *see*:

Site Installation Documentation

4 Strap the cables using the appropriate cable tie anchor.

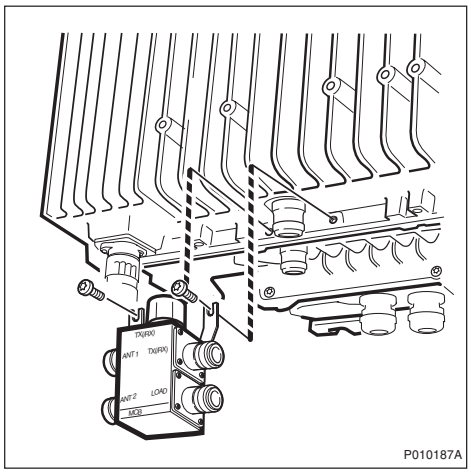


5 Install the MCB protection cover under the RRU and fasten the two screws.

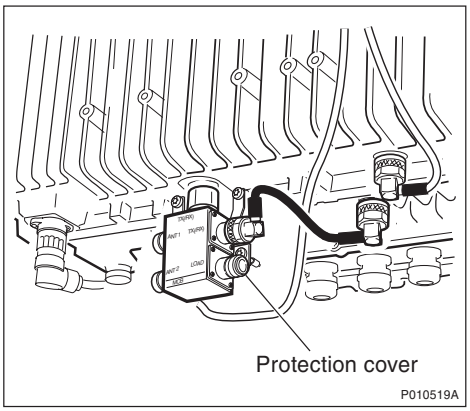


5.4.11.2 Multicasting Function

1 Remove the protection cover from connector **TX(/RX) 2** on the RRU and install the MCB to it. Fasten it with the two short screws.



2 Connect the first cable between connection port **TX(/RX)** on the MCB and **TX(/RX) 1** on the RRU. Cover connection port **LOAD** with protection cover removed from connection port TX(/RX) 2.

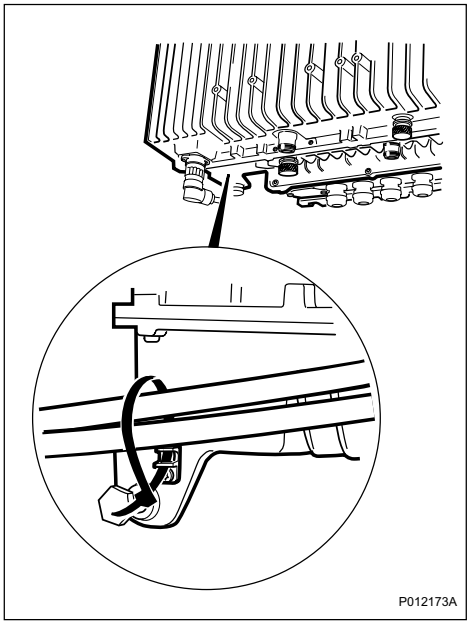


3 Connect the antenna cables to connection ports **ANT 1** and **ANT 2**.

For more information about antenna connections, *see*:

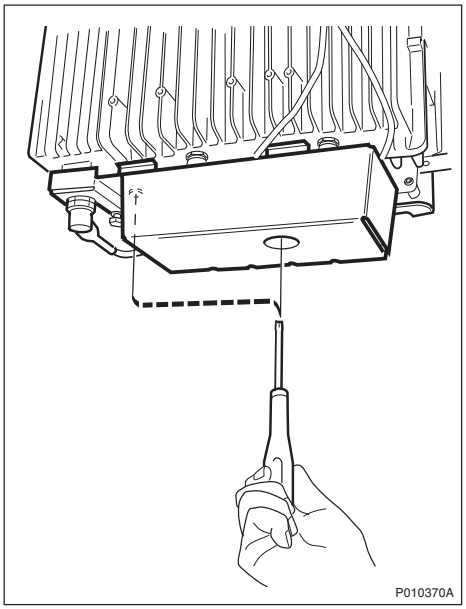
Site Installation Documentation

4 Strap the cables using the appropriate cable tie anchor.



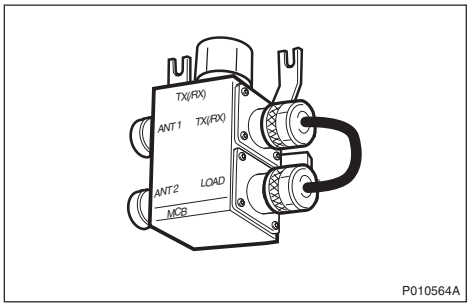
5 Install the MCB protection cover under the RRU, and fasten the two screws.

Note: Ensure that cables are not squeezed or damaged by the cover.

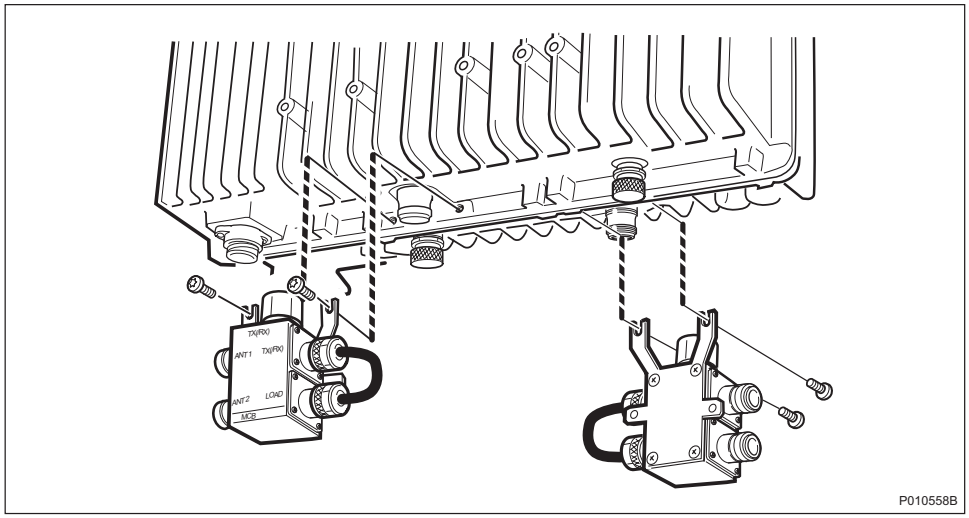


5.4.11.3 Splitting/Highway Function

1 Connect the cable between connection port **TX(/RX)** and **LOAD** on both the MCBs.



2 Remove the protection covers from connector **TX(/RX) 1** and **TX(/RX) 2** on the RRU. Install the MCBs to the connection ports. Fasten each of them with two short screws.

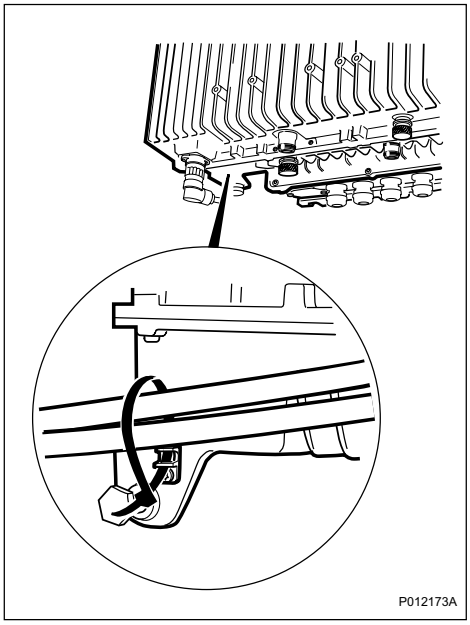


3 Connect the antenna cables to connection ports **ANT 1** and **ANT 2** on both MCBs.

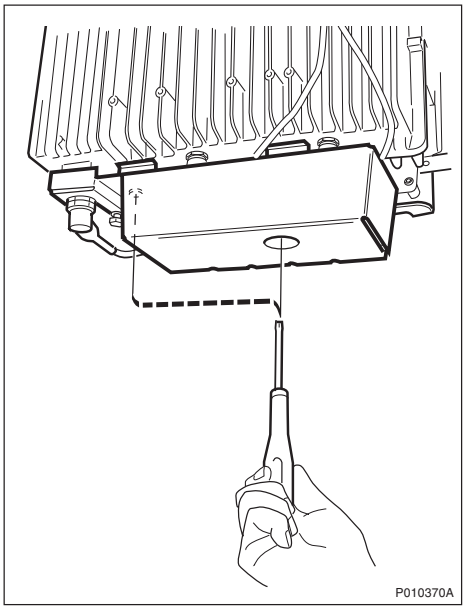
For more information about antenna connections, *see*:

Site Installation Documentation

4 Strap the cables using the appropriate cable tie anchor.



5 Install the MCB protection cover under the RRU and fasten the two screws.



5.4.12 Installing the Integral Omni Antenna (If Applicable)

This section describes how to install the integral Omni Antenna on the RRU.

1. Remove the RRU earthing cable if it has been previously installed. *See Section 5.4.8 Connecting Earth Cables on page 66*

2. Mount the Omni Antenna bracket on top of the RRU, and tighten the captive screws.

3. Install the RRU earthing cable.

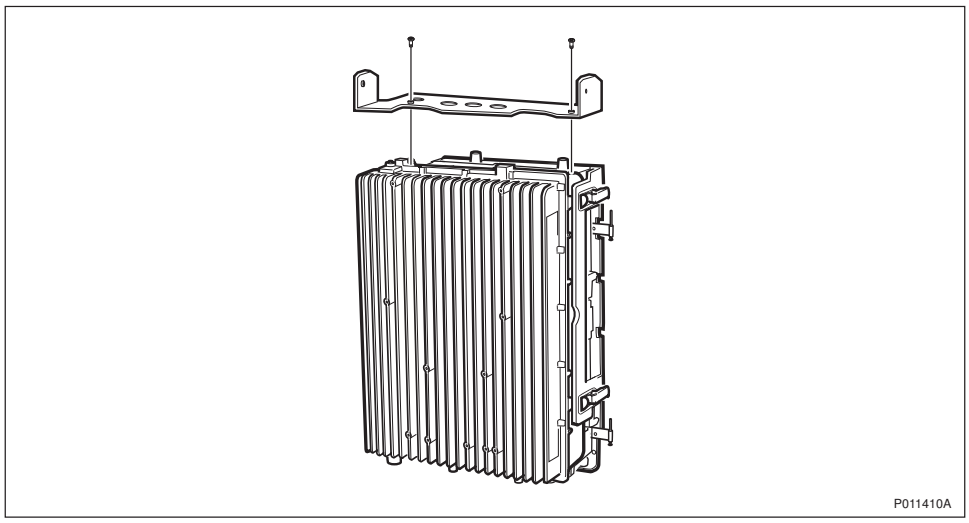


Figure 27 Mounting the Antenna Bracket

4. Attach the antenna on the bracket. Use the two captive screws on each side of the antenna.

5. Route and fasten the antenna cable with two clamps on the right side of the RRU.

6. Secure the antenna with the sunshield, *see Section 5.4.16 on page 77*.

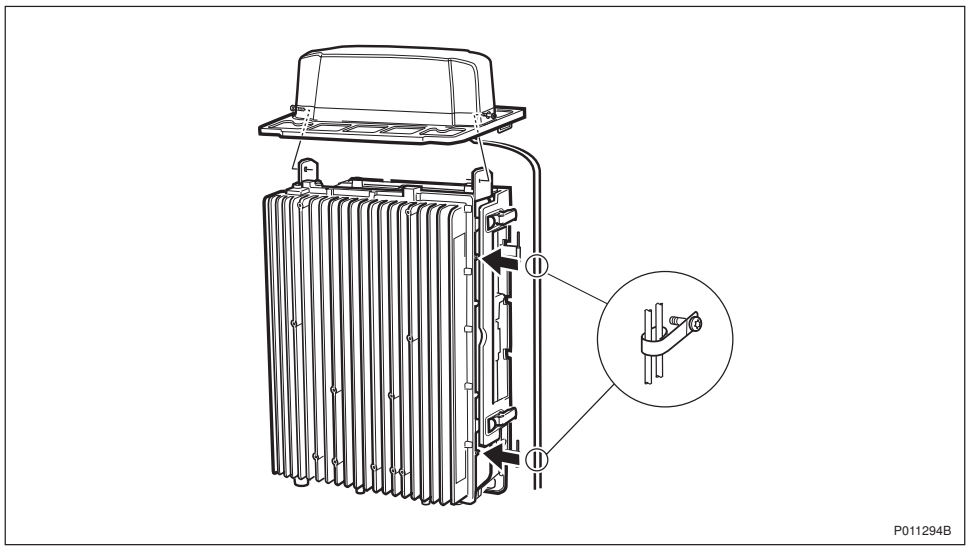


Figure 28 Installing the Omni Antenna

5.4.13 Installing the Integral Sector Antenna (If Applicable)

This section describes how to install a Sector Antenna on the RRU.

1. Attach the Sector Antenna on the front of the RRU. Secure it with four screws.

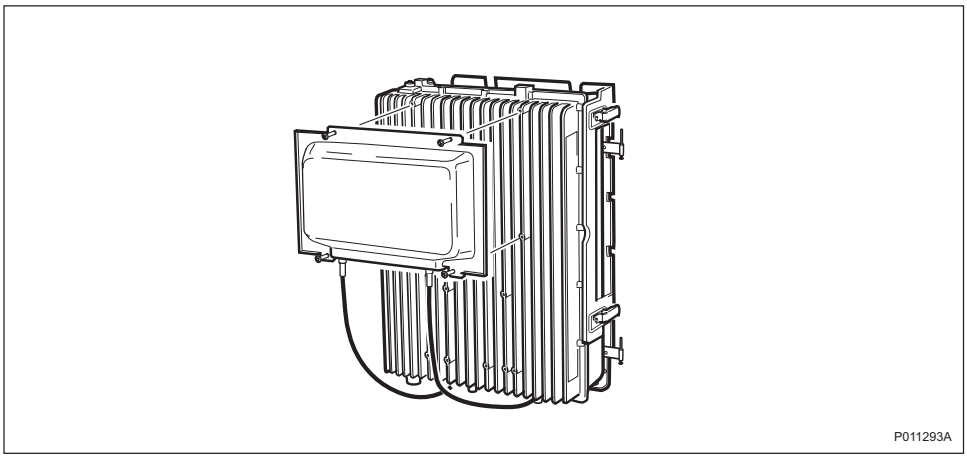
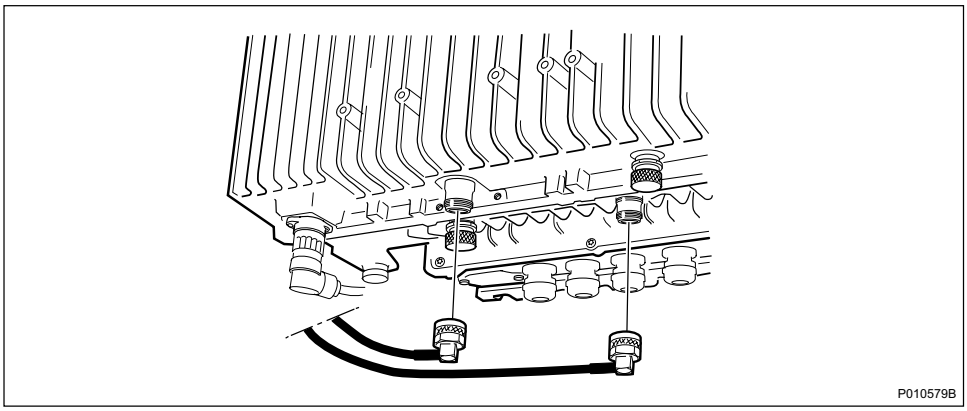


Figure 29 Installing the Sector Antenna

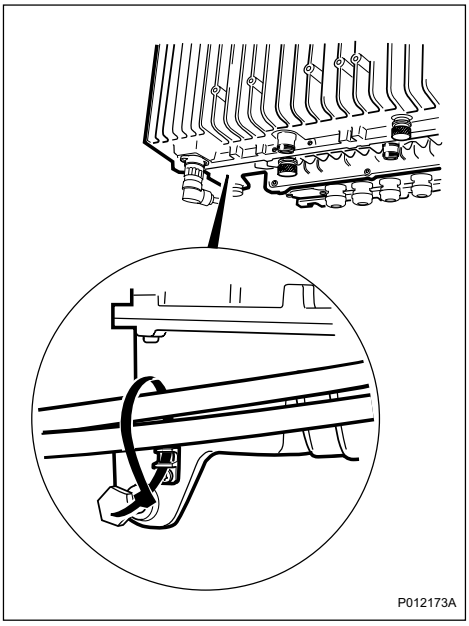
5.4.14 Connecting RBS Antenna Cables

This section describes how to connect antenna cables when a MCB or integral antenna is not used.

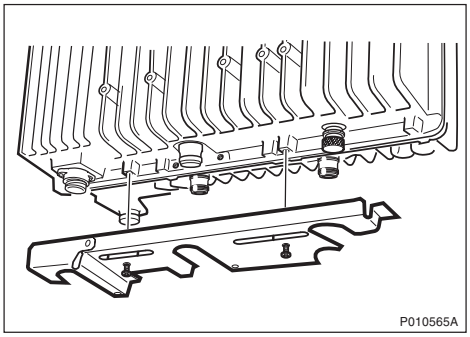
1 Connect the RBS jumpers to connection port **TX(/RX) 1** and **TX(/RX) 2**, and tighten with the appropriate torque wrench. *See Table 9 on page 43*.



2 Strap the cables using the appropriate cable tie anchor.



3 Install the protective cover under the RRU.



5.4.15 Testing the Installation

The RBS is now ready for the site installation tests.

The site installation tests should be performed directly after the completion of the RBS installation, *see Chapter Site Installation Tests*.

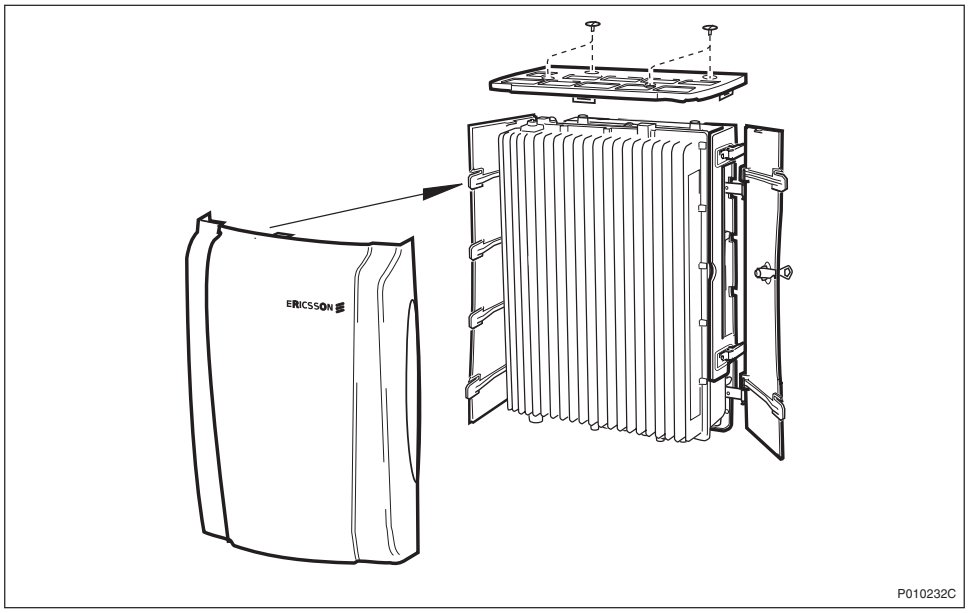
After the installation and integration testing is completed, return to *Section 5.4.16 on page 77*.

5.4.16 Installing the Sunshields

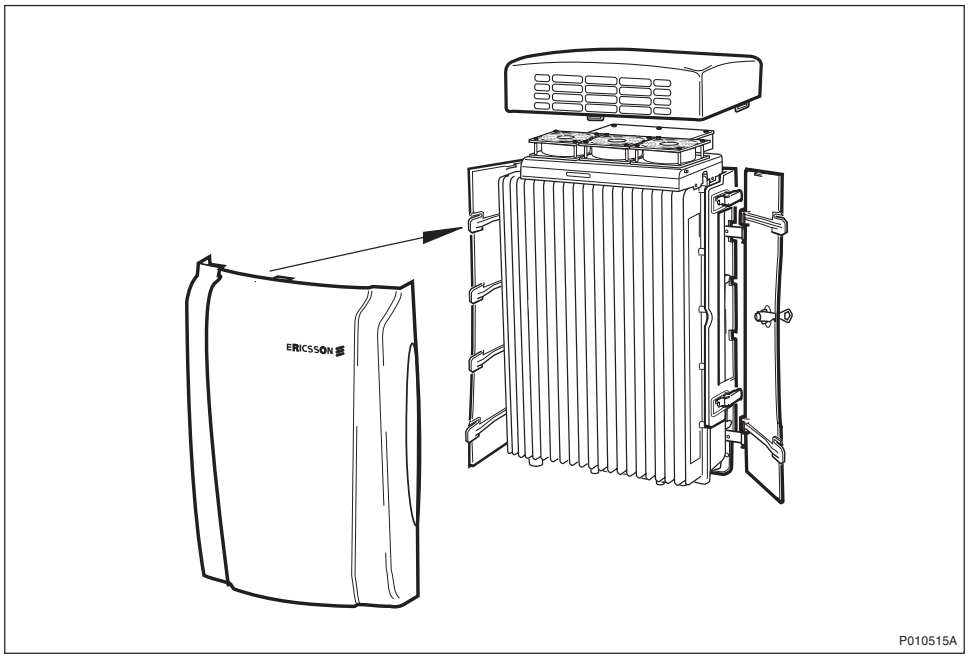
This section describes how to install the sunshields.

Different sunshields are used depending on whether or not components are installed on the front of the RRU.

1. If the fan unit or integral Omni Antenna are not used, install the top sunshield and fasten two screws either to the RRU or the IXU. *See Figure below*.



2. If the fan unit is used, install the fan cover on top of the RRU. *See Figure below*.



3. Attach the front sunshield to the left sunshield.
4. Close the front sunshield and attach it to the top shield (fan cover) and to the right sunshield.
5. Lock the shield.

5.4.17 Performing Concluding Routines

This section describes the routines to be completed before leaving the site.

Note: Ericsson strongly advises that when cleaning up after installing the RBS, the personnel performing the installation pay particular attention to the environment. Primarily, recycle all waste materials that can be recycled and sort waste so that it can be disposed of according to local regulations.

Table 11 Objects to Be Recycled or Disposed of After RBS Installation

Item	Sort or Recycle?
Cable insulation from crimping, brazing or welding	Sorted with plastics
Packing chips	
Foam	
Polystyrene	
Bubble plastic	
Cable tie clippings	
Paper and wood	Paper recycling
Waste metal from cable ladders	Recycled or sorted as metals
Pieces of cable	
Nuts, bolts, washers and screws	

Note: All packing material should be recycled, and shock absorbers disposed of, in accordance with local recycling regulations.

5.4.17.1 Updating the Site Installation Documentation

1. Check the *Site Installation Documentation* for deviations from the installation.
2. Update the documents with the changes that apply.
3. Send the documents to the person responsible for Site Installation Engineering.

5.4.17.2 Performing Final Checks

Before leaving the site, make sure that the following tasks have been completed:

Table 12 Checklist

	Check the following:	OK
1	All cables are properly routed and connected.	
2	All sunshields are properly installed.	
3	The site is clear of waste materials.	
4	The Site Installation Documentation is updated.	
5	The modified Site Installation Documentation has been handed over to the person responsible for the site.	
6	The RBS is powered up if the surrounding temperature changes between hot and cold and the RBS installation is not completed within 48 hours.(1)	

(1) See Chapter Site Installation Tests.

6 Antenna System Tests

This chapter describes the tests, Distance To Fault (DTF) and Standing Wave Ratio (SWR), used to verify the antenna system installation. The tests also include measuring the feeder length to calculate feeder system loss and delay.

The tests described are valid for GSM 800/900/1800/1900 passive antenna systems for RBS 2308 and RBS 2309.

Equipment for Antenna System Tests

The Anritsu Site Master S331C is recommended for the tests described in this chapter.

The following Site Master models can be used, if available:

- S120A for GSM 800/900
- S235A for GSM 1800/1900
- S251A/B for GSM 800/900/1800/1900
- S331A/B for GSM 800/900/1800/1900

Note: Instructions for these older instruments are not included in this manual.

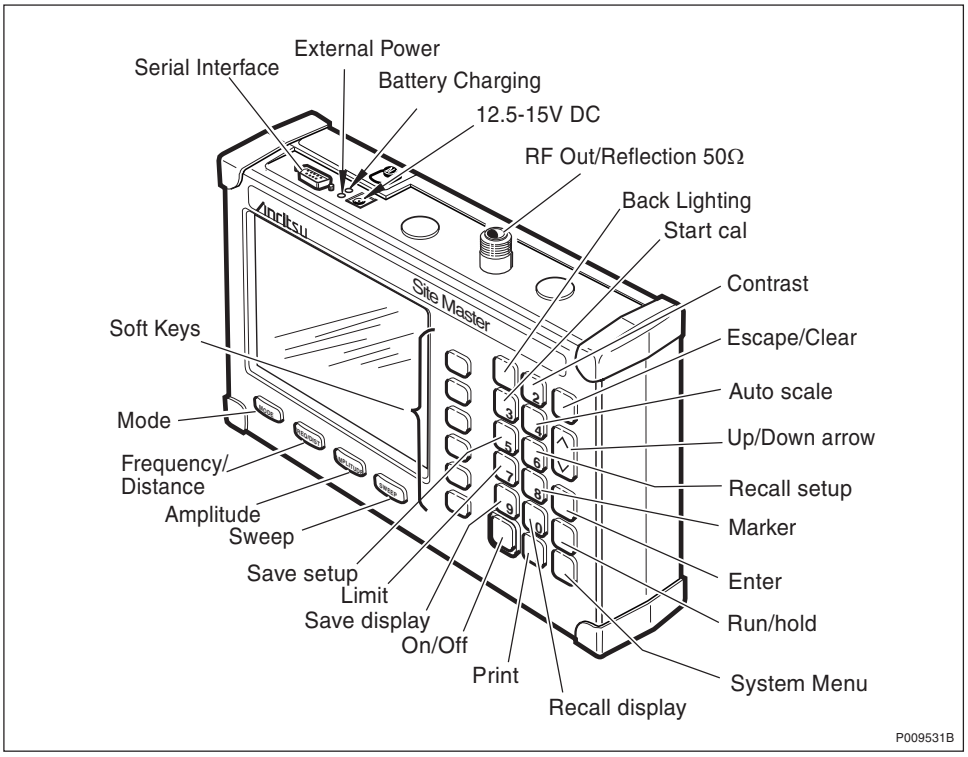


Figure 30 Anritsu Site Master S331C

The keys mentioned in the instructions in this chapter are shown in the figure above. In the instructions a ‘‘key’’ is marked with the text describing its function, while a ‘‘soft key’’ has its text displayed on the screen (next to the key).

For more detailed information on the Antritsu Site Master, *see*:

Anritsu Site Master User's Guide

Preconditions

Before starting the tests, ensure the following:

- For the DTF Tests, that the installation of feeder cables with jumpers is complete prior to testing
- For the SWR Test, that the connection of antennas and feeder cables with jumpers is complete prior to testing. It is recommended not to cover the connectors with sealing tape until all testing is complete.
- A test record for recording the test results is available

Work Process for Antenna System Tests

This section describes the order in which to perform the tests. When the exit criteria for each procedure are fulfilled, the tester enters the results in the test record, then returns to the work process for the next step.

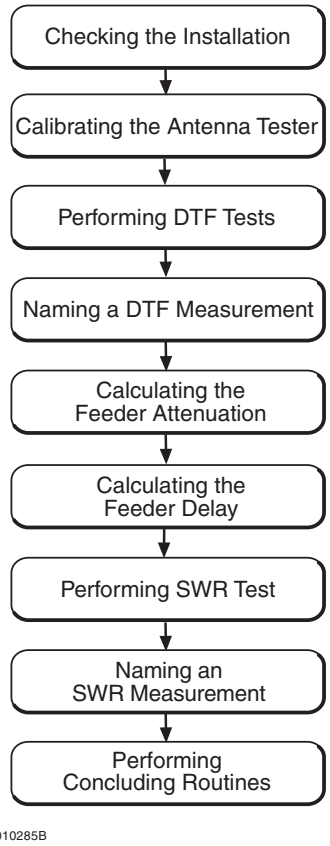


Figure 31 Work Process for Antenna System Tests

The work order can be altered or tests can be removed due to local circumstances. In this event, an investigation of the consequences must be carried out. If the work order is changed or tests are removed, then the department responsible for this manual must be notified and agree to changes, or the responsibility is automatically transferred to the person making the decision.

6.1 Checking the Installation

This section describes how to check that the antenna system installation is correct.

1. Verify that the installation is installed in accordance with the *Site Installation Documentation.*
2. Check that all cables or connectors are free of damage, and that all cables (feeders and jumpers) are properly marked.
3. Check that all connectors are properly connected and tightened.
4. Check that the bend radius specification of all feeders and jumpers has not been exceeded.
5. Verify the antenna directions against the *Site Installation Documentation.* Consider magnetic influences from nearby metallic objects and deviations from magnetic north when using the compass.
6. Check that the correct cable is connected to the correct antenna.
7. Record remarks, if any, in the test record and forward them to the person responsible for the site installation.

6.2 Calibrating the Antenna Tester

This section describes how to calibrate the Site Master, to achieve accurate Test results and to compensate for Test Port Extension Cables.

The calibration includes selecting and setting the frequency range before the calibration, performing the calibration and entering the cable parameters in the Site Master.

Note: The Site Master must be calibrated each time the frequency range is changed.

The Site Master also needs to be calibrated if one of the following messages is shown in the display: "CAL OFF" or "↑°C".

6.2.1 Selecting Frequency Range

This section describes how to select and set the correct frequency range in the Site Master.

1. Press the **FREQ/DIST key**.
2. Press the **F1** soft key.
3. Enter the ***Start frequency*** in MHz, from the table below. Press **ENTER**.
4. Press the **F2** soft key.
5. Enter the ***Stop frequency*** in MHz, from the table below. Press **ENTER**.
6. Check that the FREQ (MHz) scale in the display area indicates the correct frequency start and stop values.

Table 13 Start and Stop Frequencies

System	Start Freq. (MHz)	Stop Freq. (MHz)
GSM 800	800	1000
GSM 900	800	1000
E-GSM 900	800	1000
GSM 1800	1700	1900
GSM 1900	1800	2000

6.2.2 Performing Calibration

This section describes how to perform the calibration of the Site Master.

To calibrate the Site Master, a Precision Open/Short/Load is needed; this is shown in the figure below.

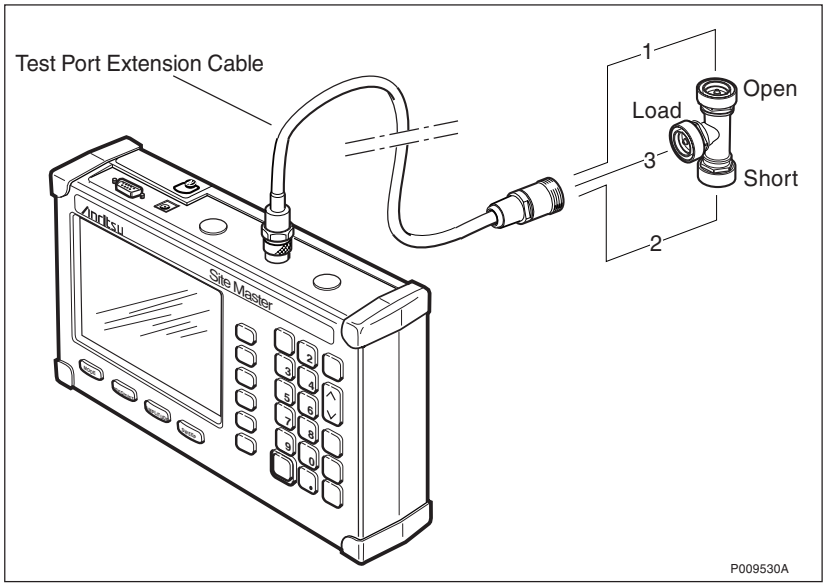


Figure 32 Connecting the Open/Short/Load

For correct calibration results, ensure that the Open/Short/Load is connected at the end of the Test Port Extension Cable, at the same point where the test object is to be connected.

1. Connect the Test Port Extension cable.
2. Ensure that the correct frequency range is selected.
3. Press the **START CAL** key.

4. Connect the ''Open'' and press **ENTER**. Wait for the measurement to be completed.
5. Repeat step 4 for ''Short'' and ''Load'' according to the step-by-step instructions on the screen.
6. When the calibration is complete, disconnect the calibration equipment from the Test Port Extension Cable.

After the calibration, the display shows ''CAL ON'' as long as the calibration is valid.

6.2.3 Entering Cable Parameters

To achieve accurate DTF test results, the correct cable parameters, velocity factor, and attenuation (dB/m) for the feeder type must be entered.

1. Press the **MODE** key and select ''DTF-SWR'' by using the **Up**/**Down arrow** key. Press **ENTER**.
2. Press the **DTF-AID** soft key.
3. Use the **Up**/**Down arrow** key to select ''CABLE LOSS''. Press **ENTER**.
4. Enter the ***cable loss*** in dB per metre for the type of feeder being tested, from the table below. Press **ENTER**.
5. Use the **Up**/**Down arrow** key to select ''PROP VEL''. Press **ENTER**.
6. Enter the ***relative velocity*** for the type of feeder being tested, from the table below. Press **ENTER**.

Table 14 Velocity Factor and Attenuation for Different Cables

Feeder Type Andrew	**Velocity Factor (PROP VEL)**	**Attenuation, dB/m (CABLE LOSS)**			
		GSM 800	**GSM 900**	**GSM 1800**	**GSM 1900**
1/4“ LDF1	0.86	0.124	0.129	0.189	0.195
1/4” FSJ1 (flex)	0.84	0.179	0.186	0.270	0.278
3/8“ LDF2	0.88	0.106	0.110	0.161	0.166
3/8“ FSJ2 (flex)	0.83	0.121	0.127	0.185	0.191
1/2” LDF4	0.88	0.066	0.069	0.101	0.104
1/2” FSJ4 (flex)	0.81	0.107	0.112	0.166	0.171
7/8” LDF5	0.89	0.037	0.039	0.058	0.060
1 1/4” LDF6	0.89	0.027	0.028	0.042	0.043
1 5/8” LDF7	0.88	0.022	0.023	0.035	0.036

Note: If the cable type is not found in the table above, the values must be taken from the manufacturer's specifications.

6.3 Performing DTF Tests

The purpose of the Distance To Fault (DTF) test is to verify that there are no bad connections or other faults (for example sharp bends) in the feeder system. It also measures the length of the feeder system to be used in the feeder attenuation calculation.

It is recommended to perform the DTF tests during the installation phase, before the antennas are connected.

6.3.1 Connecting DTF Test Setup

This section contains test setups and information about how to connect the test equipment for the DTF tests.

1. Connect the 50 Ω standard load to the antenna connector of the feeder. *See figure below.*

2. Connect the test equipment to the RBS jumper. *See figure below*.

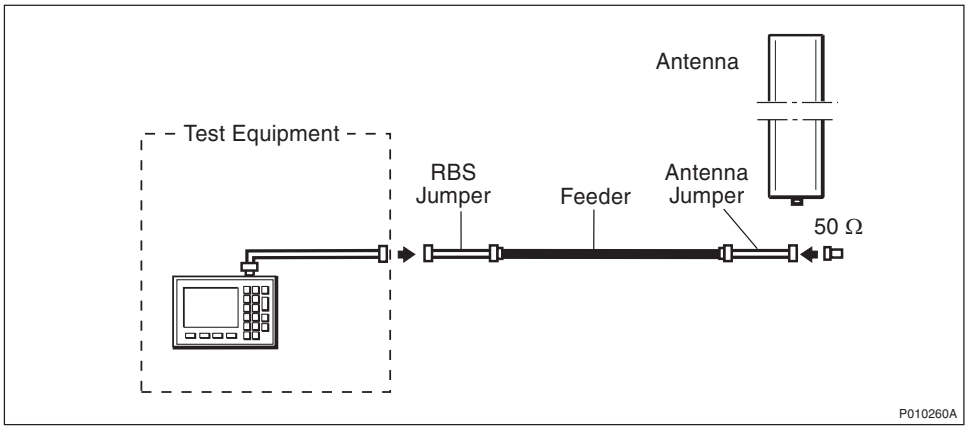


Figure 33 DTF Test Setup

3. Check that all connections are properly connected and tightened.

6.3.2 Testing Feeder Installation

1. Check that the Site Masters display shows ''CAL ON'', indicating that the Site Master is calibrated. If the display shows ''CAL OFF'', calibrate the Site Master according to *Section 6.2 Calibrating the Antenna Tester on page 84.*

2. Ensure that the test equipment is connected according to *Section 6.3.1 Connecting DTF Test Setup on page 87.*

3. Press the FREQ/DIST key to set the frequency.

4. Press the **D1** soft key, enter the desired ***start value*** (usually 0.0 m) and press **ENTER**.

5. Press the **D2** soft key, enter the desired ***stop value*** (usually a slight overestimation of the total length of the feeder system) and press **ENTER**.

6. Press the **AMPLITUDE** key to set the scale.

7. Press the **TOP** soft key, enter `1.2` and press **ENTER**.

8. Press the **LIMIT EDIT** soft key and enter `1.05`. Press **ENTER**.

   Note: Ensure that Limit is ON by pressing the **LIMIT ON/OFF** soft key.

9. Wait while the Site Master is calculating (6 to 22 seconds depending on selected display resolution).

10. Observe the waveform. Examples of acceptable and unacceptable DTF measurement results are shown in the figures below.

11. Check that no reflections are above 1.05 SWR (31.5 dB Return Loss). *See Table 19 on page 104,* if necessary.

Example of an Acceptable DTF Measurement

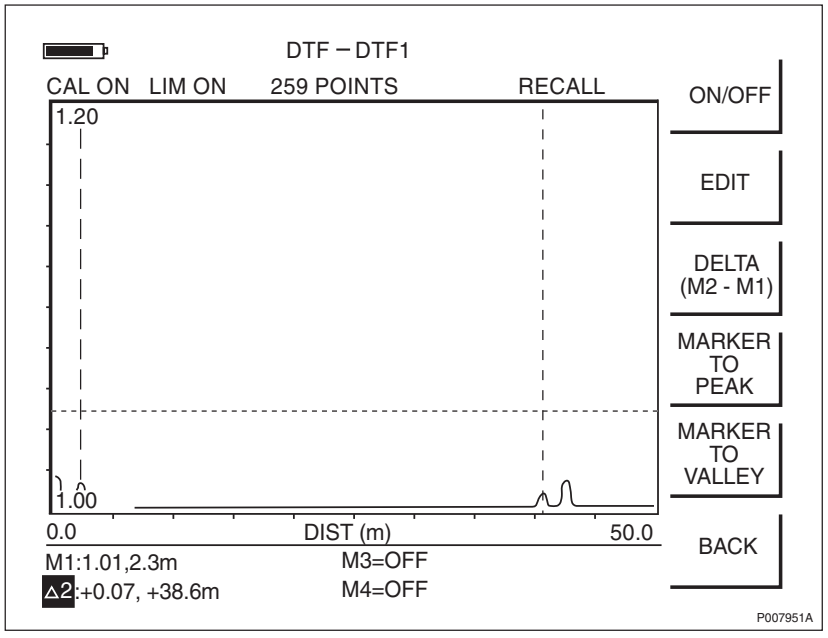


Figure 34 Example of an Acceptable DTF Measurement

Example of an Unacceptable DTF Measurement

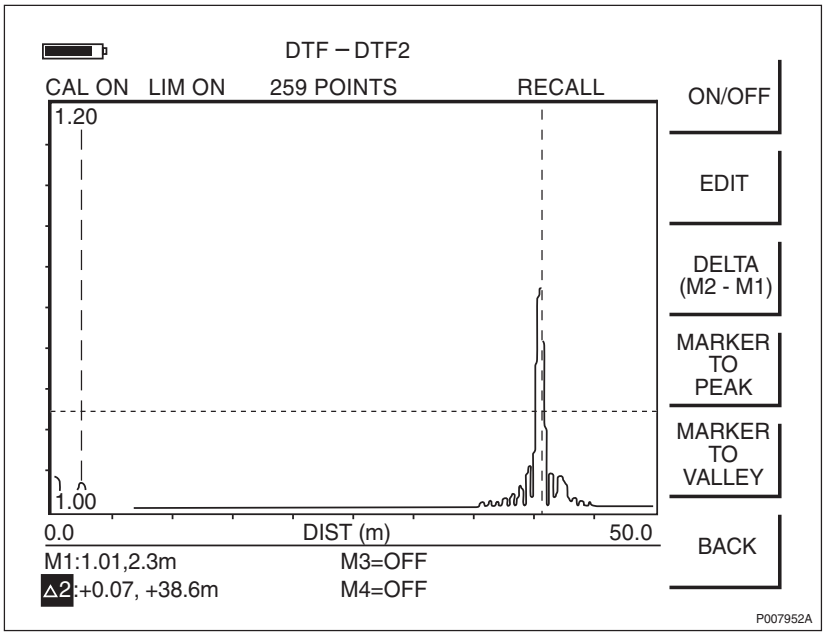


Figure 35 Example of an Unacceptable DTF Measurement

6.3.3 Measuring Feeder Length

This section describes how to measure the feeder length, based on the result of the test in chapter Section 6.3.2 Testing Feeder Installation on page 87.

1. Press the **MARKER** key.
2. Press the **M1** soft key.
3. Press the **EDIT** soft key and place the M1 marker at the near end of the feeder using the **UP**/**DOWN arrow** key. *See figure below*.

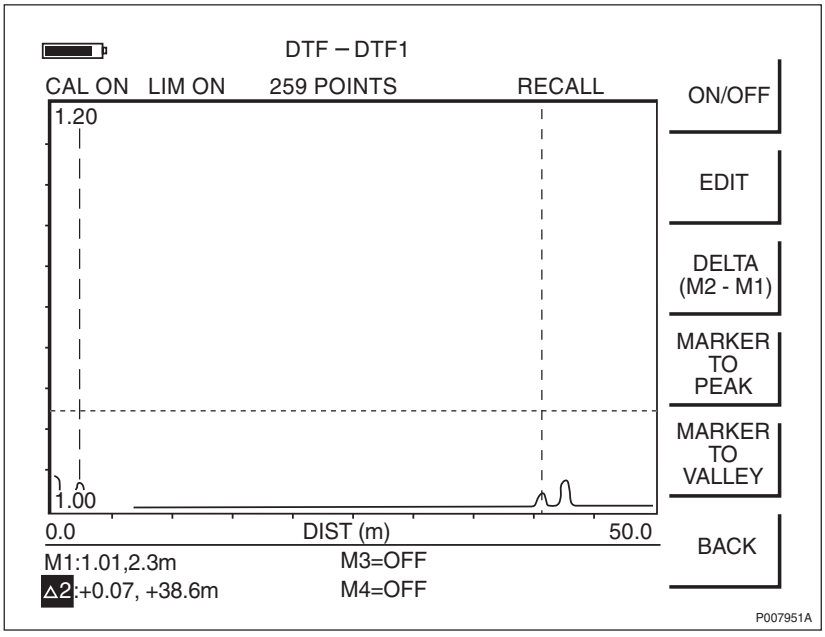


Figure 36 Placing the M1 and M2 Markers

4. Press the **BACK** soft key and then the **M2** soft key.

5. Press the **EDIT** soft key and place the M2 marker at the far end of the feeder, using the **UP**/**DOWN arrow** key. *See figure above*.

6. Press the **DELTA (M2–M1)** soft key and enter the Δ_2 value as the feeder length in the test record.

7. Create a unique trace name according to *Section 6.4 Naming a DTF Measurement on page 90*. Save the measurement by pressing the **SAVE DISPLAY** key. Type in the trace name using the alphanumeric soft keys, and press **ENTER**.

6.4 Naming a DTF Measurement

This section describes how to give the measurement a unique name that is traceable to a specific antenna system on a specific site.

1. Find the cell ID in the *Site Installation Documentation*.

2. Read the label text on the jumper being measured.

3. Combine the measurement type, cell ID and label text (a unique name with a maximum of 16 characters).

The following example illustrates these steps:

1. The cell ID found in the *Site Installation Documentation* is "SOF007_A".
2. The text on the feeder label is "Cell A: DX1".
3. The type of measurement is DTF, so the name of the measurement is "DTFSOF007ADX1".

Example 1 Naming a DTF Measurement

6.5 Calculating the Feeder Attenuation

This section describes how to calculate the attenuation of the feeder system.

1. Use the feeder length measured in *Section 6.3.3 Measuring Feeder Length on page 89.*
2. Find the attenuation value (dB/m) for the cable type in the table below. Calculate the total attenuation for each feeder and jumper, by multiplying the length in meters by the attenuation per meter.
3. Add the attenuations for the feeder and the jumpers, *see Table 15 on page 92.*
4. Enter the **result** of the calculation in the test record.
5. Repeat the DTF test, and calculate the feeder attenuation for all antenna feeders on the site.

Table 15 Attenuation for Different Cables

Feeder Type Andrew	Attenuation, dB/m (CABLE LOSS)			
	GSM 800	**GSM 900**	**GSM 1800**	**GSM 1900**
1/4" LDF1	0.124	0.129	0.189	0.195
1/4" FSJ1 (flex)	0.179	0.186	0.270	0.278
3/8" LDF2	0.106	0.110	0.161	0.166
3/8" FSJ2 (flex)	0.121	0.127	0.185	0.191
1/2" LDF4	0.066	0.069	0.101	0.104
1/2" FSJ4 (flex)	0.107	0.112	0.166	0.171
7/8" LDF5	0.037	0.039	0.058	0.060
1 1/4" LDF6	0.027	0.028	0.042	0.043
1 5/8" LDF7	0.022	0.023	0.035	0.036

Note: If the cable type is not found in the table above, then the values must be taken from the manufacturer's specifications.

Example of Calculating the Total Feeder Attenuation (GSM 900)

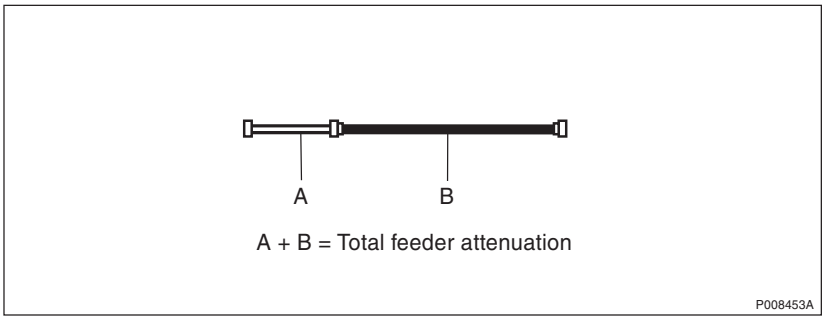


Figure 37 Example of Calculating the Total Feeder Attenuation

```
See figure above for feeders and jumpers mentioned
in the example.
The frequency band is GSM 900.

1.    The feeder length has been measured to 40 m.

2.    The cables used are:

          RBS jumper (A):
             Andrew 3/8" LDF2
             Length: 2 m
             The attenuation is 0.110 dB/m.
                  See the table.
             The total cable attenuation for the
             RBS jumper is:
                  2 x 0.110 = 0.22 dB

          Feeder (B):
             Andrew 1/2" LDF4
             Length: 40 m
             The attenuation is 0.069 dB/m.
                  See the table.
             The total cable attenuation for the
             antenna feeder is:
                  40 x 0.069 = 2.76 dB

3.    The total attenuation is:
                  0.22 + 2.76 = 2.98 dB

4.    Enter the results in the test record.
```

Example 2 Calculating the Total Feeder Attenuation

6.6 Calculating the Feeder Delay

This section describes how to calculate the total delay in the feeder system.

1. Use the feeder length measured in *Section 6.3.3 Measuring Feeder Length on page 89*.
2. Find the delay value (ns/m) for the cable type in *Table 16 on page 94*. Calculate the total attenuation for each feeder and jumper, by multiplying the length in metres with the delay per metre.
3. Add the delay for the feeder and the jumpers.
4. Enter the result of the calculation in the test record.
5. Calculate the feeder delay for all antenna feeders.

Table 16 Delay Specifications for Different Cables

Feeder Type Andrew	Delay, ns/m
1/4" LDF1	3.9
1/4" FSJ1 (flex)	4.0
3/8" LDF2	3.8
3/8" FSJ2 (flex)	4.0
1/2" LDF4	3.8
1/2" FSJ4 (flex)	4.1
7/8" LDF5	3.7
1 1/4" LDF6	3.7
1 5/8" LDF7	3.8

Note: If the cable type is not found in the table above, the values must be taken from the manufacturer's specifications.

Example of Calculating the Total Feeder Delay

```
See figure above for feeders and jumpers mentioned
in the example.
The feeder length has been measured to 40 m.

1. The cables used are:

      RBS jumper (A):
        Andrew 3/8" LDF2
        Length: 2 m
        The delay per meter is 3.8 ns.
             See the table in this chapter.
        The delay for the antenna jumper is:
             2 x 3.8 = 7.6 ns

      Feeder (B):
        Andrew 1/2" LDF4
        Length: 40 m
        The delay per meter is 3.8 ns.
             See the table in this chapter.
        The feeder delay is: 40 x 3.8 = 152 ns.

      RBS jumper (C):
        Andrew 3/8" LDF2
        Length: 2 m
        The delay per meter is 3.8 ns.
             See the table in this chapter.
        The delay for the antenna jumper is:
             2 x 3.8 = 7.6 ns

2. The total delay is:
             7.6 + 152 + 7.6 = 167.2 ≈ 167 ns.

3. Enter the results in the test record.
```

Example 3 Calculating the Total Feeder Delay

6.7 Performing SWR Test

The purpose of the Standing Wave Ratio (SWR) test is to verify that the antenna system functions correctly when it is completely installed. The test verifies that the SWR is not too high, and that the signal is not reflected back into the RBS.

6.7.1 Connecting SWR Test Setup

This section describes how to connect the SWR test setup.

1. Connect the test equipment to the RBS jumper, see figure below.
2. Check that all connections are properly connected and tightened.

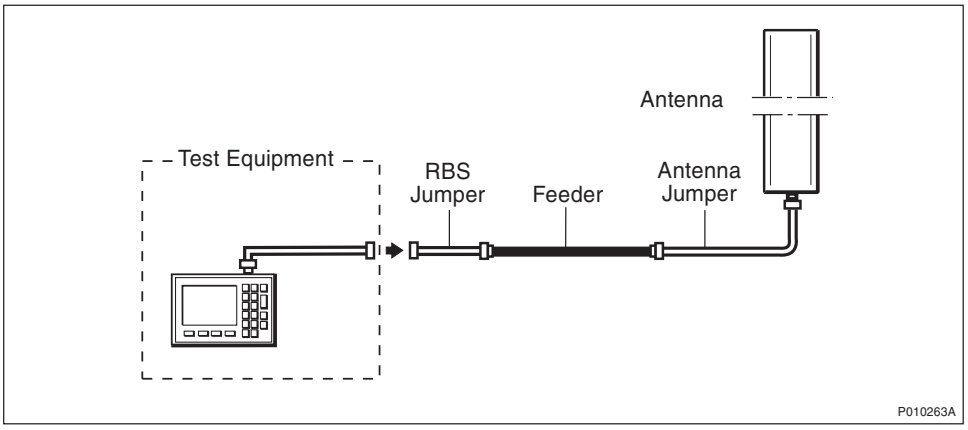


Figure 38 Test Setup

6.7.2 Testing the Antenna System

1. Check that the Site Master's display shows ''CAL ON'', indicating that the Site Master is calibrated. If the display shows ''CAL OFF'', calibrate the Site Master according to *Section 6.2 Calibrating the Antenna Tester on page 84*.
2. Ensure that the test equipment is connected according to *Section 6.7.1 on page 96*.
3. Press the **AMPLITUDE** key to set the scale.
4. Press the **TOP** soft key, enter `2.0` and press **ENTER**.
5. Press the **LIMIT EDIT** soft key, enter `1.4` and press **ENTER**.

   Note: Ensure that Limit is in ON-mode by pressing the **LIMIT ON/OFF** soft key.
6. Observe the trace in the frequency range according to the table below.

Table 17 Measurement Frequency Range for Passive Antenna Systems

System	Start Freq. (MHz)	Stop Freq. (MHz)
GSM 800	824	894
GSM 900	890	960
E-GSM 900	880	960
GSM 1800	1710	1880
GSM 1900	1850	1990

7. Check that no SWR levels are over 1.4 (= 15.6 dB RL) between the frequencies stated in the table above. For conversion between VSWR and Return Loss *see Table 19 on page 104*. Enter the ***`test result`*** in the test record. For examples of approved and unapproved waveforms, see figures below.

8. Create a unique trace name in accordance with *Section 6.8 Naming an SWR Measurement on page 98*. Save the measurement by pressing the **SAVE DISPLAY** key. Type in the trace name using the alphanumeric soft keys, and press **ENTER**.

9. Repeat the SWR test for each feeder on the site.

Example of an Acceptable SWR Measurement

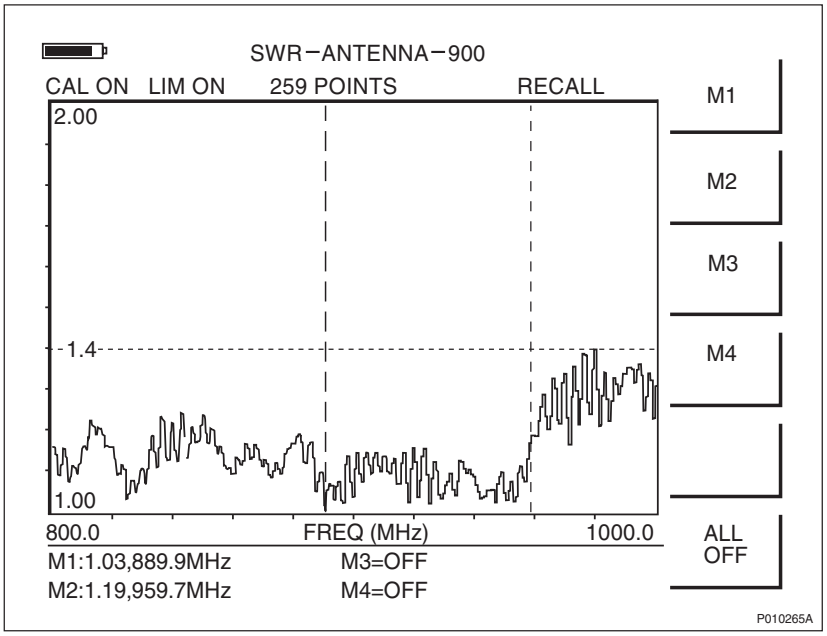


Figure 39 Example of an Acceptable SWR Measurement

Example of an Unacceptable SWR Measurement

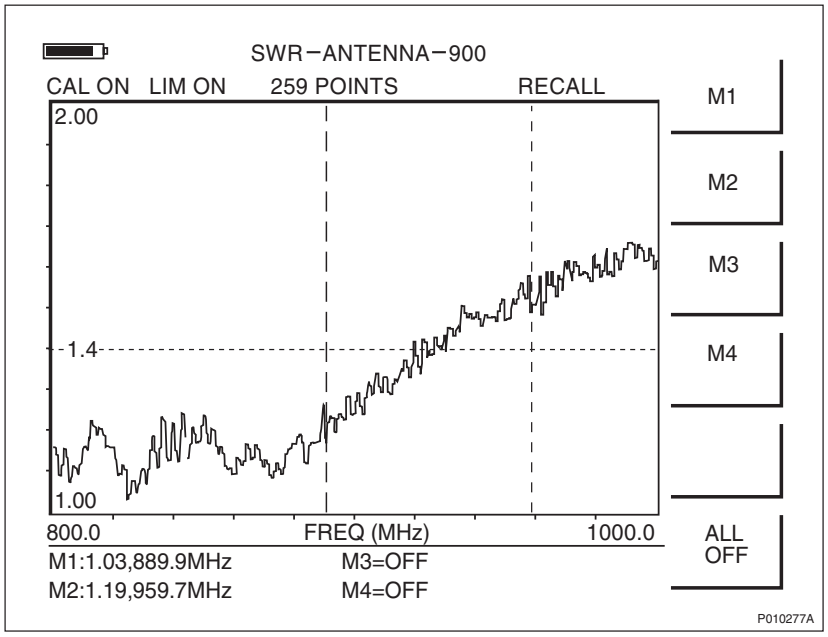


Figure 40 Example of an Unacceptable SWR Measurement

6.8 Naming an SWR Measurement

This section describes how to give the measurement a unique name traceable to the correct antenna system on the correct site.

1. Find the cell ID in the *Site Installation Documentation*.
2. Read the label on the jumper measured.
3. Combine the measurement type, cell ID, and label text (a unique name with a maximum of 16 characters).

The following example illustrates these steps: *Site Installation Documentation*

```
1. The cell ID found in the Site Installation
   Documentation is "SOF007_A".
2. The text on the feeder label is "Cell A: DX1".
3. The type of measurement is DTF, so the name of
   the measurement is "SWRSOF007ADX1".
```

Example 4 Naming an SWR Measurement

6.9 Performing Concluding Routines

This section describes the actions to be taken before leaving the site, and provides a checklist.

6.9.1 Completing Test Record

The form below is to be filled out during site work, and must be completed before leaving the site.

Test Record for Antenna System Tests

Date:	Site Name:
Site No:	RBS Serial No:
Tester's Name:	
Test Instrument: Anritsu Site Master S_____	Serial Number:

Installation Check ☐

DTF Test

Feeder Length

	RRU 0	RRU 1	RRU 2
TX(/RX)1			
TX(/RX)2			
RX1*			
RX2*			

* If applicable

Total Feeder Attenuation

	RRU 0	RRU 1	RRU 2
TX(/RX)1			
TX(/RX)2			
RX1*			
RX2*			

* If applicable

Total Feeder Delay

	RRU 0	RRU 1	RRU 2
TX(/RX)1			
TX(/RX)2			
RX1*			
RX2*			

* If applicable

SWR Test

SWR/Return Loss

	RRU 0	RRU 1	RRU 2
TX(/RX)1			
TX(/RX)2			
RX1*			
RX2*			

* If applicable

Cable Marking: _____

_____

Signatures

Responsible for the Record Date: _____ Name: _____

Customer Acceptance Date: _____ Name: _____

Remarks _____

_____

_____

P012352B

Figure 41 Test Record for Antenna System Tests

Test Record for Antenna System Tests

Date:	Site Name:
Site No:	Cell Configuration:
Tester's Name:	
Test instrument:	Serial Number:

Installation Check

DTF Test

Cell A

	DX 1	TX 1	RX-A	DX 2	TX 2	RX-B
Feeder Length						
Total Feeder Attenuation						
Total Feeder Delay						

Cell B

	DX 1	TX 1	RX-A	DX 2	TX 2	RX-B
Feeder Length						
Total Feeder Attenuation						
Total Feeder Delay						

Cell C

	DX 1	TX 1	RX-A	DX 2	TX 2	RX-B
Feeder Length						
Total Feeder Attenuation						
Total Feeder Delay						

SWR Test

Cell A

DX 1	TX 1	RX-A	DX 2	TX 2	RX-B

Cell B

DX 1	TX 1	RX-A	DX 2	TX 2	RX-B

Cell C

DX 1	TX 1	RX-A	DX 2	TX 2	RX-B

Signatures

Responsible for the record Date: _____ Name: _____

Customer acceptance Date: _____ Name: _____

Remarks _____

P012725A

Figure 42 Test Record for Antenna System Tests

6.9.2 Making a Test Record Supplement

The figure below is an example of a printout from the Site Master Software Tools. This should be added as a supplement to the test protocol, and included in the *Site Installation Documentation*.

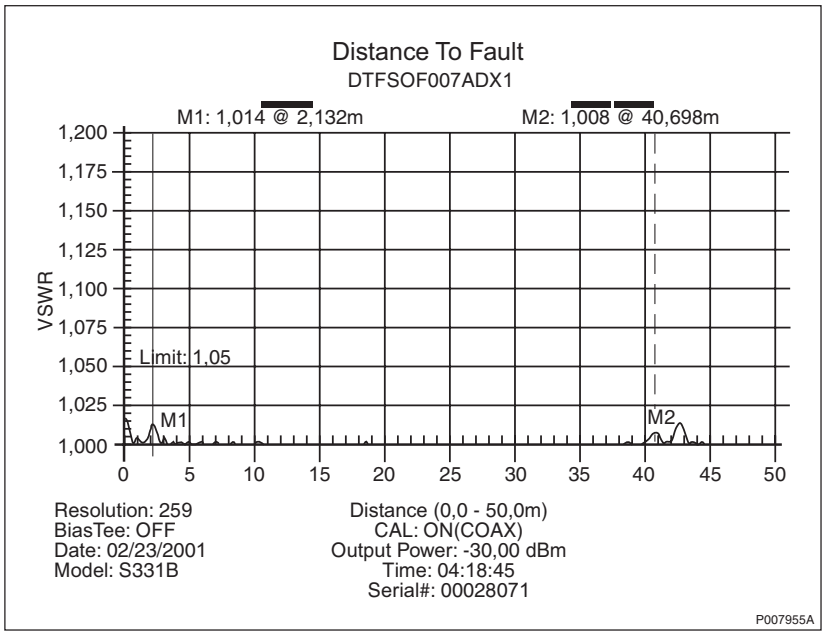


Figure 43 Example of a DTF Measurement Plot

After saving all test results in the Site Master, the test results must be transferred to a PC using the serial cable and the Site Master Software Tools. *See the instructions below*. For further instructions, *see:*

Anritsu Site Master User's Guide

1. Connect the Site Master to the PC's serial port, using the serial cable.
2. Start the Site Master Software Tools on the PC.
3. Click the **Start Plot Capture** button in the Site Master Software Tools.
4. Select the desired plots from the Plots Download dialog box and click **OK**.
5. Save the plots to the PC.
6. Print the plots from the Site Master Software Tools, and insert them in the *Site Installation Documentation*.

6.9.3 Filling in the Checklist

The following checklist is not mandatory but is strongly recommended. Local procedures and safety regulations must be evaluated and included in this checklist.

Table 18 Checklist

Check the following:	OK
1. That all outdoor antenna system connectors are covered with sealing tape.	
2. That the test record is filled in.	
3. That the *Site Installation Documentation* is completed with the test record and the test record supplements.	

6.10 SWR ↔ Return Loss Conversion Table

This section provides the corresponding Standing Wave Ratio (SWR) measurements for a range of Return Loss values, if needed.

Table 19 Conversion Table

Return Loss (dB)	SWR	Return Loss (dB)	SWR	Return Loss (dB)	SWR
4.0	4.42	16.0	1.38	28.0	1.08
6.0	3.01	16.2	1.37	28.5	1.07
8.0	2.32	16.4	1.36	29.0	1.07
10.0	1.92	16.6	1.35	29.5	1.07
10.5	1.85	16.8	1.34	30.0	1.06
11.0	1.79	17.0	1.33	30.5	1.06
11.2	1.76	17.2	1.32	31.0	1.05
11.4	1.74	17.4	1.31	31.5	1.05
11.6	1.71	17.6	1.30	32.0	1.05
11.8	1.69	17.8	1.29	32.5	1.04
12.0	1.67	18.0	1.29	33.0	1.04
12.2	1.65	18.5	1.27	33.5	1.04
12.4	1.63	19.0	1.25	34.0	1.04
12.6	1.61	19.5	1.23	34.5	1.03
12.8	1.59	20.0	1.22	35.0	1.03
13.0	1.58	20.5	1.21	35.5	1.03
13.2	1.56	21.0	1.20	36.0	1.03
13.4	1.54	21.5	1.18	36.5	1.03
13.6	1.53	22.0	1.17	37.0	1.02
13.8	1.51	22.5	1.16	37.5	1.02
14.0	1.50	23.0	1.15	38.0	1.02
14.2	1.48	23.5	1.14	38.5	1.02
14.4	1.47	24.0	1.13	39.0	1.02
14.6	1.46	24.5	1.12	39.5	1.02
14.8	1.44	25.0	1.12	40.0	1.02
15.0	1.43	25.5	1.11	40.5	1.01
15.2	1.42	26.0	1.10	41.0	1.01
15.4	1.41	26.5	1.10	41.5	1.01
15.6	1.40	27.0	1.09	42.0	1.01
15.8	1.39	27.5	1.08	42.5	1.01

7 Site Installation Tests

This section describes the test procedure for site installation tests.

7.1 Preconditions

Before starting the tests, ensure the following:

- A completed test record for Antenna System Tests is available
- The nominal AC mains voltage and/or DC supply on the site is known

Note: The information above can be found in:

Site Installation Documentation

- A test record is available
- Chapter Safety Instructions has been read

7.1.1 Documentation

The list below displays the manual required for site installation tests.

Table 20 Required Manual for Site Installation Tests

Product Name	Description	Product Number
OMT User's Manual	Included in OMT Kit	EN/LZN 720 0001

7.1.2 Before Starting Test Procedure

Before starting the test procedure, ensure the following:

- All personal rings, wrist watches, and other metallic objects are removed before working with the power system
- The necessary tools, instruments, and documentation are available

7.1.3 Work Process for Site Installation Tests

This section describes the order in which to perform the tests. When the exit criteria are fulfilled, the tester should enter the results in the test record, and return to the work process for the next step in the process.

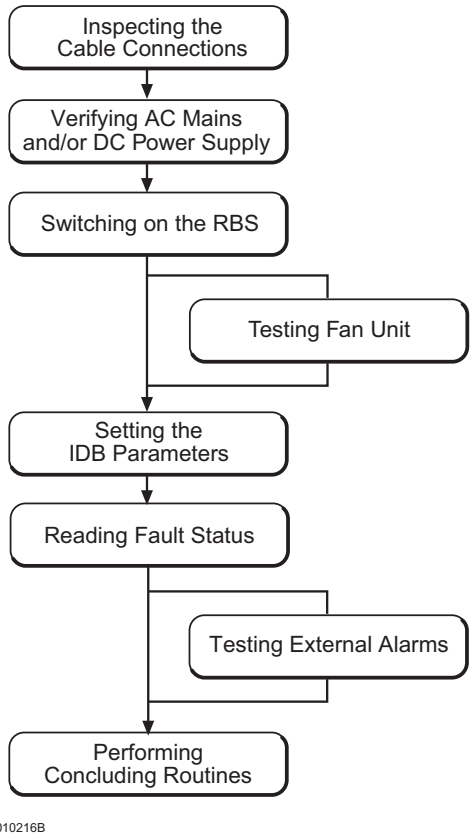


Figure 44 Work Process for Site Installation Tests

The work order can be altered or tests can be removed due to local circumstances, but if this is the case, an investigation of the consequences must be carried out. If the work order is changed or tests are removed, the department responsible for this document must be notified and agree to the changes, or the responsibility is automatically transferred to the person making the decision.

7.2 Inspecting Cable Connections

1. Ensure that all power switches on the MBU are switched off.

2. Check that all cables are properly connected and all connections tightened.

7.3 Checking AC Mains and DC Power Supply

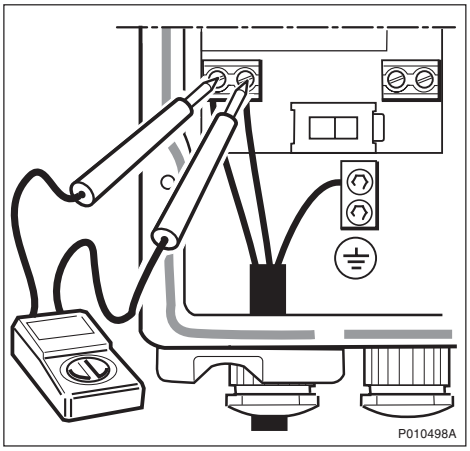
This section describes how to verify that the RBS has the correct incoming AC Mains and, where applicable, DC power.

Danger!

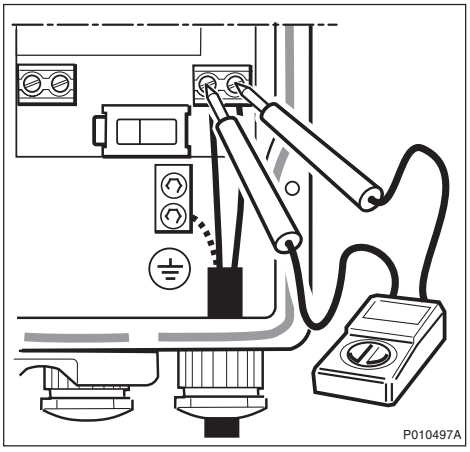
Electric shock risk. Avoid both direct and indirect contact with parts connected to mains power as this is likely to be fatal. Switch off the mains power before starting work.

1 Open the sunshields and the RRU, and remove the lid from the MBU.

2 If applicable, measure the incoming AC Mains power to the RBS, using a multimeter. Check that the incoming AC Mains power is between 100 and 127 V AC, or between 200 and 250 V AC.



3 If applicable, measure the incoming DC power to the RBS, using a multimeter. Check that the incoming DC power is between – 40.5 and – 60 V DC.



4 Put back the MBU lid and tighten the screws.

7.4 Switching on RBS

This section describes how to switch on the RBS.

1 Switch on the RBS AC on/off switches on the MBU on all cabinets. Repeat this procedure for the RBS DC on/off and the RRU on/off switches.

2 Before continuing testing of the site installation, ensure that the indicators on the RRU and IXU interface panels have the status shown in the table below when the RBS is in local mode.

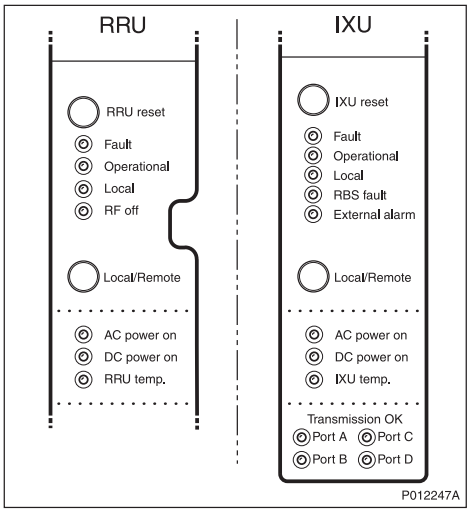


Table 21 RRU Indicators Before Setting the IDB Parameters

RRU	**Status**
Fault	Off
Operational	Off
Local	N/A
RF off	On
AC power on	On(1)
DC power on	On(1)
RRU temp.	Off

(1) Depending on power system configuration.

Table 22 IXU Indicators Before Setting the IDB Parameters

IXU	Status
Fault	Off
Operational	Off
Local	On
RBS fault	Off
External alarm	Off
AC power on	On(1)

Table 22 IXU Indicators Before Setting the IDB Parameters

DC power on	On(1)
IXU temp.	Off
Transmission OK	On/Off(2)

(1) Depending on power system configuration.
(2) Status, depending on transmission configuration.

Note: In cold conditions, the RBS may need up to 60 minutes to warm up, during which time the IXU or RRU temperature indicator is on. The internal heater works only with an AC power supply.

3. If the Operational indicator on the RRU and/or IXU is flashing, SW is being downloaded. Wait until the indicator switches off before continuing.

4. If the Local indicator on the IXU is off or flashing, press the **Local**/**Remote** button to set the IXU in local mode.

7.5 Testing Fan Unit

This section describes how to test the optional fan unit (if applicable).

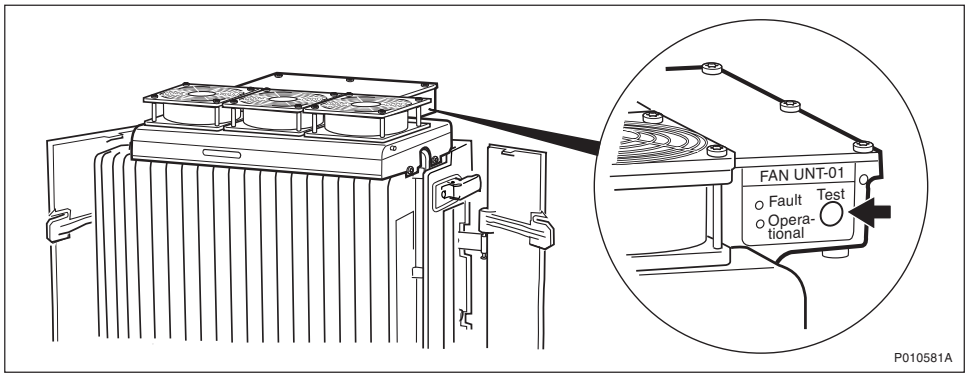


Figure 45 Location of Fan Unit Test Button

1. Remove the fan unit cover.

2. Press the **Test** button on the fan unit.

   The fan unit performs a self test.

3. Check that the sequence below is carried out:

- The fans run at maximum speed for approximately 5 seconds
- The fans run at nominal speed for approximately 5 seconds
- The fans stop for approximately 5 seconds

4. Ensure that the indicator status of the fan unit is in accordance with the table below:

Table 23 Fan Unit Indicators After Test

Fan unit Indicator	Status
Fault	Off
Operational	On

5. Put back the fan unit cover.

7.6 Setting IDB Parameters

This section describes how to set the IDB parameters using the Operation and Maintenance Terminal (OMT).

For more information on the use of the OMT, *see*:

OMT User's Manual *EN/LZN 720 0001*

Work Process for Setting IDB Parameters

This section describes the work process for setting the IDB parameters.

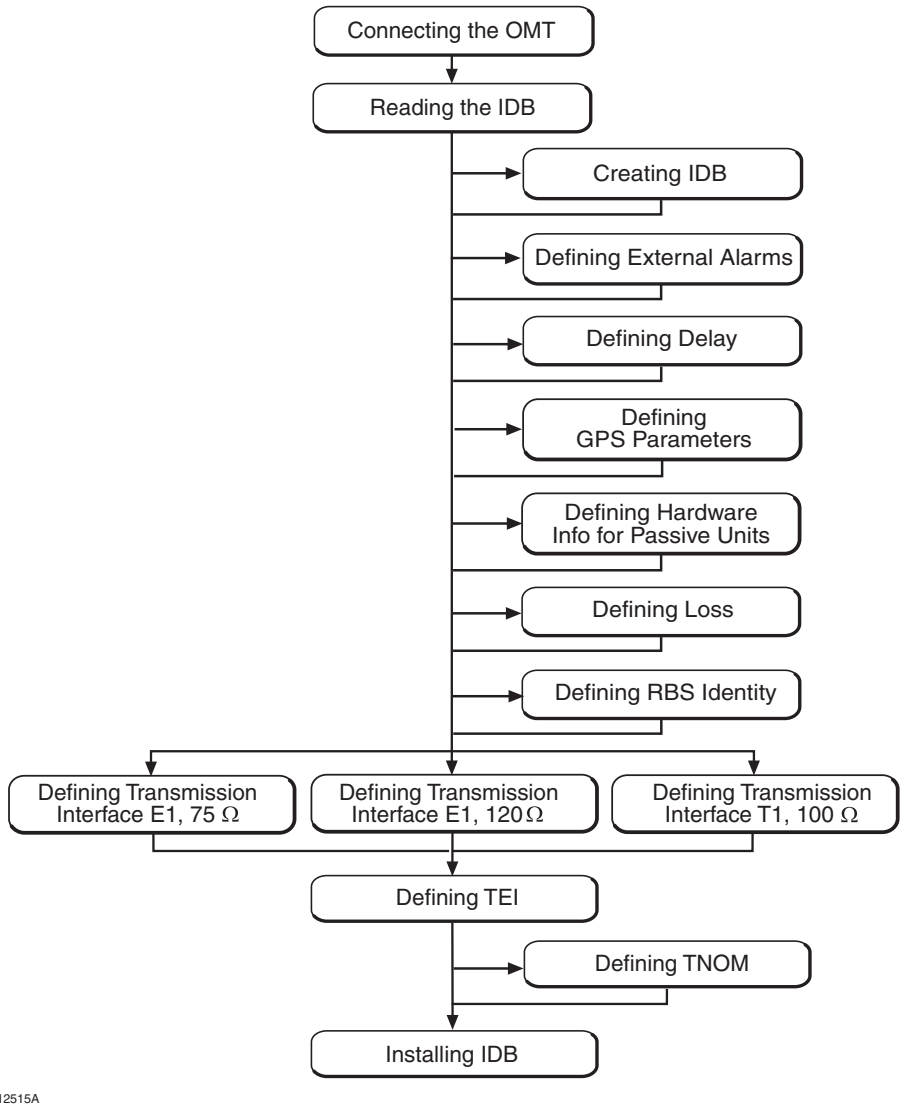


Figure 46 Work Process for Setting IDB Parameters

Note: The IDB parameter values required are found in:

Site Installation Documentation

7.6.1 Connecting OMT

This section describes how to connect the OMT physically to the RBS.

1. Remove the lid from the OMT port on the IXU.

2. Connect the OMT cable from the PC serial port to the OMT port on the right-hand side of the IXU. If an extended OMT cable is connected to the OMT port, then connect the OMT cable to the end of the extended OMT cable.

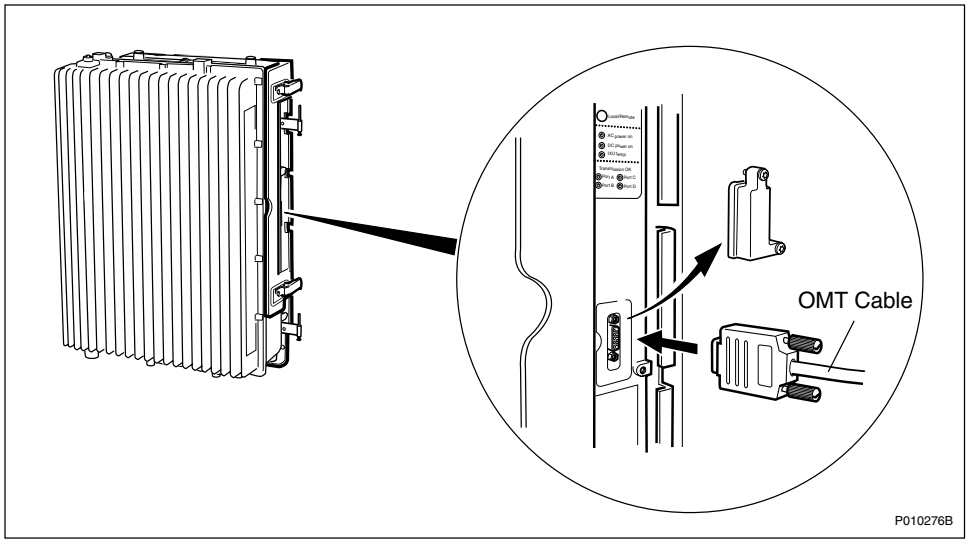


Figure 47 Connecting OMT to IXU

3. Start the OMT.

7.6.2 Reading IDB

This section describes how to read the IDB in the OMT to check if the values of the IDB parameters are correct.

1. On the **RBS 2000** menu, click **Connect** to connect the OMT logically to the RBS.
2. On the **Configuration** menu, click **Read IDB**.
3. On the **Configuration** menu, click **Display** and then **Information** to enter the Display Information window.
4. Select **IDB** and click **Run**. Check the parameters listed in the table below.

Table 24 Reading and Checking IDB

Check that the following parameters are correct:	**OK**
Transmission interface	
Cabinet configuration(s)	
Antenna sector configuration(s)	

5. If the IDB parameters in the table above need to be set, *see Section 7.6.3 Creating IDB on page 113*.

If the IDB parameters above are correct, set the following applicable site-specific IDB parameters:

- Alarm inlets (external alarms)
- Delay
- GPS parameters
- Hardware Information
- Loss
- RBS Identity
- Transmission (PCM) parameters
- TEI value for IXU
- TNOM parameters

7.6.3 Creating IDB

This section describes how to define the configuration setup in the OMT. The OMT can detect the cabinet setup if the **Detected HW Information** checkbox in the **Create IDB** window is selected.

Note: The OMT must be logically connected to the RBS to be able to retrieve the HW information.

Defining Transmission Interface

1. On the **RBS 2000** menu, ensure that the OMT is logically disconnected from the RBS.
2. On the **Configuration** menu, click **Create IDB** to open the Create IDB window.
3. Select the transmission interface.

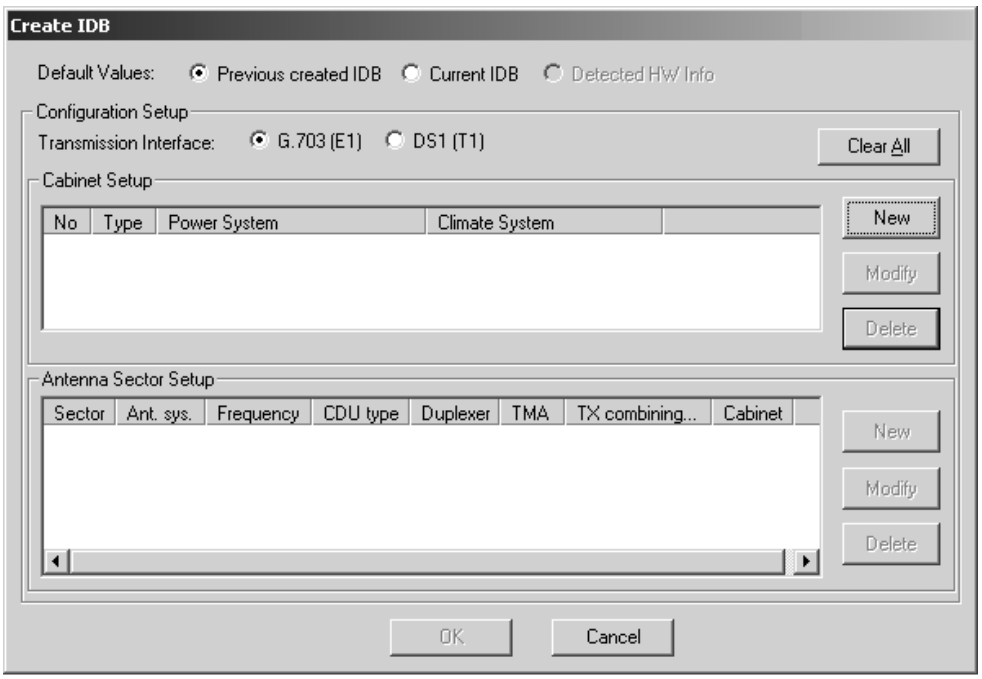


Figure 48 Creating IDB

Defining Cabinet Setup

1. To add cabinets to the Cabinet Setup box, click **New** to open the Define Setup for Cabinet window.
2. In the Cabinet Type box, select the RBS type:

   – 2308

   – 2309
3. In the Define Master Cabinet Setup window, select the applicable master cabinet configuration and click **OK**:

   – IXU

   – IXU/RRU
4. Select the power system used:

   – 230/115 V AC, no backup

   – 230/115 V AC, external battery

   – –48 V DC
5. If an RRU is present in the cabinet, select the climate system used:

– Cooling by convection

– Fan unit

6. Click **OK** when finished.

7. Repeat steps 4 to 9 to add another RRU cabinet to the configuration.

Defining Antenna Sector Setup

For different Site Cell Configurations (SCC), the number of cells is related to antenna sectors. The number of TRXs is related to the number of RRUs (antenna systems). The RBS 2308 has four TRX/RRU and RBS 2309 has two TRX/RRU.

Example 1: For an RBS 2309 in a SCC = 1x4, define an RBS with two RRUs (two TRX/RRU) and then define one antenna sector with two antenna systems (RRUs).

Example 2: For an RBS 2308 in a SCC = 3x4, define an RBS with three RRUs (four TRX/RRU) and then define three antenna sectors with one antenna system (RRU).

1. To add antenna systems for an antenna sector, click **New** in the Antenna Sector Setup window.

2. To define an antenna system for a sector, click **New**.

3. In the Frequency box, select the frequency used.

4. In the Duplexer box, select ''Yes'' if the RRU internal duplexer is used (duplex mode) and ''No'' if not (simplex mode). This selection is only applicable for RBS 2308 configured with 800/1900 RRUs.

5. Click **OK**.

6. To define another antenna system within the same antenna sector, click **New** again.

7. Click **OK**, or repeat step 6 for adding more RRUs within the same antenna sector.

8. To define an antenna system in a new sector, repeat steps 1 to 7.

9. Click **OK** in the Create IDB window when all antenna sectors are defined.

The Final Configuration Selection window appears.

Selecting Final Configuration

1. In the Final Configuration Selection window, select the SCC.

2. Verify that the correct parameters have been entered. Click **OK**.

3. In the OMT dialog box asking ''Do you really want to overwrite the IDB data in the OMT?'', click **Yes**.

4. In the OMT dialog box asking ''Do you want to re-use data in the previous configuration?'', click **Yes** if the IDB is to be modified only, and **No** if a new IDB is to be configured.

7.6.4 Defining External Alarms

This section describes how to define the external alarms, that is, customer-specific alarms, if applicable. *See Site Installation Documentation.*

1. On the **Configuration** menu, click **Define** and **Alarm Inlets** to open the Define Alarm Inlets window.

2. In the Alarm Inlet Information window, select a physically connected alarm inlet that needs to be defined.

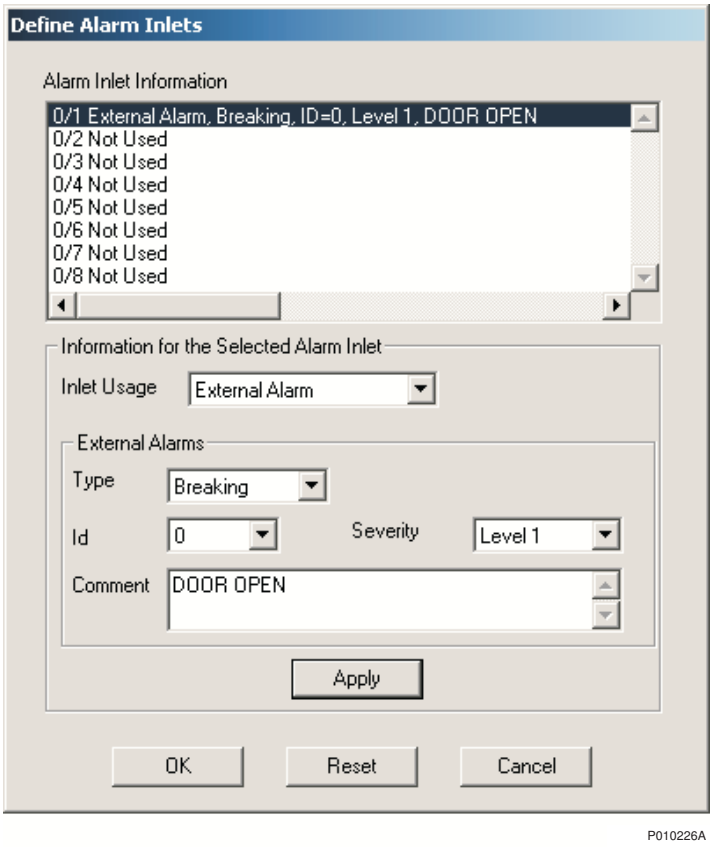


Figure 49 Defining Alarm Inlets

3. In the Inlet Usage box, select ''External Alarm''.

4. In the Type box, define the alarm type as ‘‘Closing’’ (the alarm is issued when the alarm loop closes) or ‘‘Breaking’’ (the alarm is issued when the alarm loop breaks).

5. In the ID box, give the alarm the appropriate ID number.

6. In the Severity box, set the severity level of the alarm.

7. Add a message in the Comment box.

   This message will be displayed in the BSC/OMT if the alarm is issued.

8. Click **Apply** after defining the alarm.

9. Repeat steps 2 to 8 to define remaining alarms.

10. Click **OK** when all alarms are defined.

Defining External Alarms for EBB and PBC

The alarms for EBB and PBC should be defined according to the tables below.

EBB-01

Table 25 External Alarm Definitions for EBB-01

Alarm Inlet	Inlet Usage	Type	Id	Sever-ity	Comment
0/5	External Alarm	Breaking	(1)	Level 2	Battery backup fault
0/6	External Alarm	Breaking	(1)	Level 2	Battery backup is about to end
0/7	External Alarm	Breaking	(1)	Level 2	Check battery

(1) Preferably, ID should be set to the same number as the corresponding alarm inlet.

EBB-06

Table 26 External Alarm Definitions for EBB-06

Alarm Inlet	Inlet Usage	Type	Id	Sever-ity	Comment
0/4	External Alarm	Breaking	(1)	Level 2	Battery backup fault

(1) Preferably, ID should be set to the same number as the corresponding alarm inlet.

PBC

Table 27 External Alarm Definitions for PBC

Alarm Inlet	Inlet Usage	Type	Id	Sever-ity	Comment
0/4	External Alarm	Breaking	(1)	Level 2	Battery backup fault

(1) Preferably, ID should be set to the same number as the corresponding alarm inlet.

7.6.5 Defining Delay

This section describes how to define RX and TX feeder delay.

1. On the **Configuration** menu, click **Define** and **Delay** to open the Define Delay window.
2. Select the cable for which delay is to be defined, and click **Run**.
3. Enter the delay value (in ns) and click **OK**.
4. Repeat steps 2 and 3 for the remaining cables.
5. Click **Close** when finished.

7.6.6 Defining GPS Parameters

This section describes how to define the GPS parameters. To be able to use GPS as a synchronisation source, the RBS must be equipped with a GPS receiver.

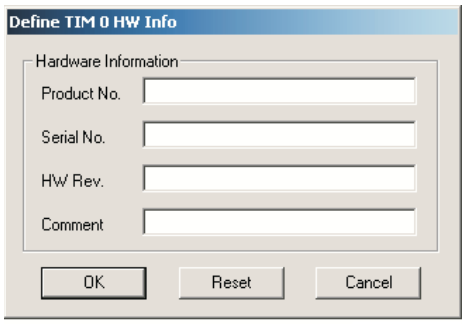
1. On the **Configuration** menu, click **Define** and **GPS Parameters** to open the Define GPS Parameters window.
2. Select Yes for GPS present.
3. Enter the GPS RX delay (in ns). This is the delay in the GPS antenna, GPS antenna feeder cables and GPS receiver.
4. Enter the GPS RX DXU delay. This is the delay from the GPS receiver to the IXU, including the delay in the OVP and optional EBB.
5. Click **OK** when finished.

7.6.7 Defining Hardware Information for Passive Units

This section describes how to define hardware information for passive units, if applicable. *See Site Installation Documentation.*

1. On the **Configuration** menu, click **Define** and **Hardware Info** to open the Define HW Info window.

2. Select the applicable HW unit in the list and click **Run**.
3. Enter the hardware information, and click **OK** when finished.



4. Repeat steps 2 to 3 for all applicable HW units.
5. Click **Close** when finished.

7.6.8 Defining Loss

This section describes how to define the Total Feeder Attenuation.

1. On the **Configuration** menu, click **Define** and **Loss** to open the Define Loss window.
2. Select the appropriate feeder cable (for example, FEED_RXA 0) and click **Run**.
3. In the Define Loss window, enter the Total Feeder Attenuation from the test record for Antenna System Tests and click **OK**. The OMT has default values for the RRU to RXBP RX cables.
4. Repeat steps 2 to 3 for each RX and TX feeder used.
5. Close the Define Loss window when finished.

7.6.9 Defining RBS Identity

This section describes how to define the RBS Identity.

1. In the **Configuration** menu, select **Define** and **RBS Identity** to open the Define RBS Identity window.
2. In the RBS name field, enter the unique RBS name.
3. In the RBS description field, enter the site name or the location of the site (maximum of 100 characters).
4. Click **OK**.

7.6.10 Defining Transmission Interface E1, 75 Ω

This section describes how to define the PCM parameters for transmission interface E1, 75 Ω.

1. On the **Configuration** menu, click **Define** and **PCM**.
2. Set the parameters according to the table and instructions below.
3. Click **OK** when all parameters are set.

Table 28 PCM Parameter Settings for Transmission Interface E1, 75 Ω

PCM Parameter		Settings
Transmission Interface		E1
Network Topology		*See Site Installation Documentation*
Sync Source		*See Site Installation Documentation*
CRC-4		*See Site Installation Documentation*
Spare bits		*See Site Installation Documentation*
Receiver Sensitivity	A	Short haul
	B	Short haul
	C	Short haul
	D	Short haul

7.6.11 Defining Transmission Interface E1, 120 Ω

This section describes how to define the PCM parameters for transmission interface E1, 120 Ω.

1. On the **Configuration** menu, click **Define** and **PCM**.
2. Set the parameters according to the table and instructions below.
3. Click **OK** when all parameters are set.

Table 29 PCM Parameter Settings for Transmission Interface E1, 120 Ω

PCM Parameter	Settings
Transmission Interface	E1
Network Topology	*See Site Installation Documentation*
Sync Source	*See Site Installation Documentation*
CRC-4	*See Site Installation Documentation*
Spare bits	*See Site Installation Documentation*

Table 29 PCM Parameter Settings for Transmission Interface E1, 120 Ω

PCM Parameter		Settings
Receiver Sensitivity	A	*See instructions below*
	B	
	C	
	D	

The instructions below describe how to calculate the cable attenuation between the Far End and the RBS. The cable attenuation determines whether receiver sensitivity is to be set to short or long haul. Use of long haul requires that the equipment at the far end supports long haul.

Note: Ports C and D can also be used as a multidrop pair.

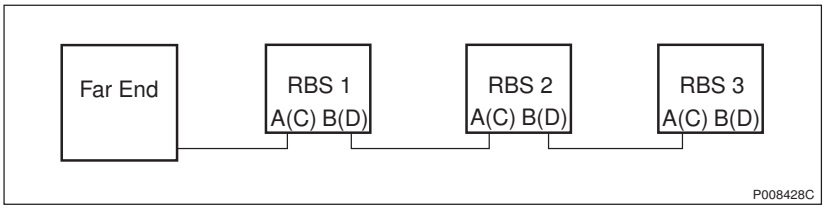


Figure 50 System View for Transmission Interface E1, 120 Ω

1. Calculate the cable attenuation between the Far End and the RBS according to the following formula:

   Cable attenuation = cable length x cable attenuation per metre (or foot).

   If multidrop is used, then calculate the attenuation of the entire RBS chain, because Receiver Sensitivity A (C) is determined by the total attenuation of the chain. Receiver Sensitivity B (D) is determined by the total attenuation to the last RBS in the chain.

2. If the cable attenuation is less than 6 dB, then set the receiver sensitivity to short haul.

   If the cable attenuation is greater than 6 dB, then set the receiver sensitivity to long haul.

3. Set unused ports to short haul.

Example of Receiver Sensitivity Parameter Calculation for E1, 120 Ω

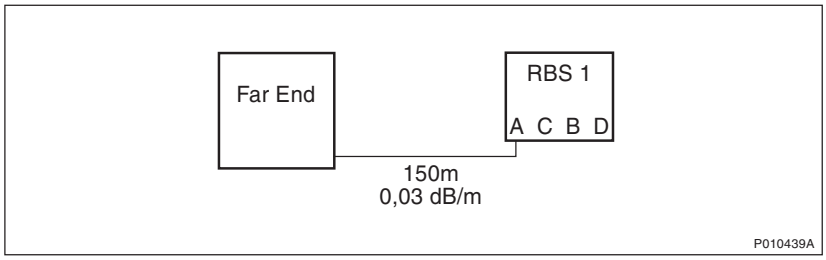


Figure 51 Example of Receiver Sensitivity Parameter Calculation for E1, 120 Ω

```
In this example, Far End and the RBS refer to
the figure above The cable length between the RBS
and the Far End is 150 m.
The cable attenuation for the cable between the RBS
and the Far End is 0.03 dB/m

1.    Calculate the cable attenuation between the
      Far End and the RBS:
      150 m x 0.03 dB/m = 4.5 dB
2.    Set Receiver Sensitivity A for the RBS to
      "Short haul".
3.    Set Receiver Sensitivity C for the RBS to
      "Short haul" (not connected).
4.    Set Receiver Sensitivity B for the RBS to
      "Short haul" (not connected).
5.    Set Receiver Sensitivity D for the RBS to
      "Short haul" (not connected).
```

Example 5 Calculating Receiver Sensitivity Parameters for Transmission Interface E1, 120 Ω

7.6.12 Defining Transmission Interface T1, 100 Ω

This section describes how to define parameters for transmission interface T1, 100 Ω. When using the cable length for calculations in the following sections, the cable used must be the reference cable (multipair 22 AWG office cable) or similar.

1. Find the transmission interface type in the *Site Installation Documentation*, and use the table below to find the applicable section with instructions for setting the parameters.

Table 30 Selecting Section for Defining T1, Transmission Interface Type Known

If the transmission interface type is...		**then...**
DSX-1		go to *Section Defining LBO Parameters as Short Haul on Page 124*.
DS1 and...	the signal level at the customer interface and the cable attenuation is known	go to *Section Defining LBO Parameters as Long Haul Manually on Page 127*.
	only the maximum input signal level at the far end is known	go to *Section Defining LBO Parameters as Long Haul Automatically on Page 130*.
	neither the signal level at the customer interface nor the cable attenuation are known	go to *Section Defining LBO Parameters when Transmission Characteristics are Unknown on Page 136*.

2. If there is no information about the transmission interface type in the *Site Installation Documentation*, use the cable length to find the appropriate section in the table below.

Table 31 Selecting Section for Defining T1, Cable Length Known

If...		**then...**
the cable length is less than 655 feet		go to *Section Defining LBO Parameters as Short Haul on Page 124*.
the cable length is more than 655 feet and...	the signal level at the customer interface and the cable attenuation is known	go to *Section Defining LBO Parameters as Long Haul Manually on Page 127*.
	only the maximum input signal level at the far end is known	go to *Section Defining LBO Parameters as Long Haul Automatically on Page 130*.
	neither the signal level at the customer interface nor the cable attenuation are known	go to *Section Defining LBO Parameters when Transmission Characteristics are Unknown on Page 136*.

3. If no information is given in Site Installation Documentation, *see the table below.*

Table 32 Selecting Section for Defining T1, Cable Length Unknown

If...	then...
there is no information about the cable length	go to *Section Defining LBO Parameters when Transmission Characteristics are Unknown on Page 136*.

Defining LBO Parameters as Short Haul

This section describes how to define the LBO parameters as short haul.

1. On the **Configuration** menu, click **Define** and **PCM** to open the Define PCM window. *See figure below.*

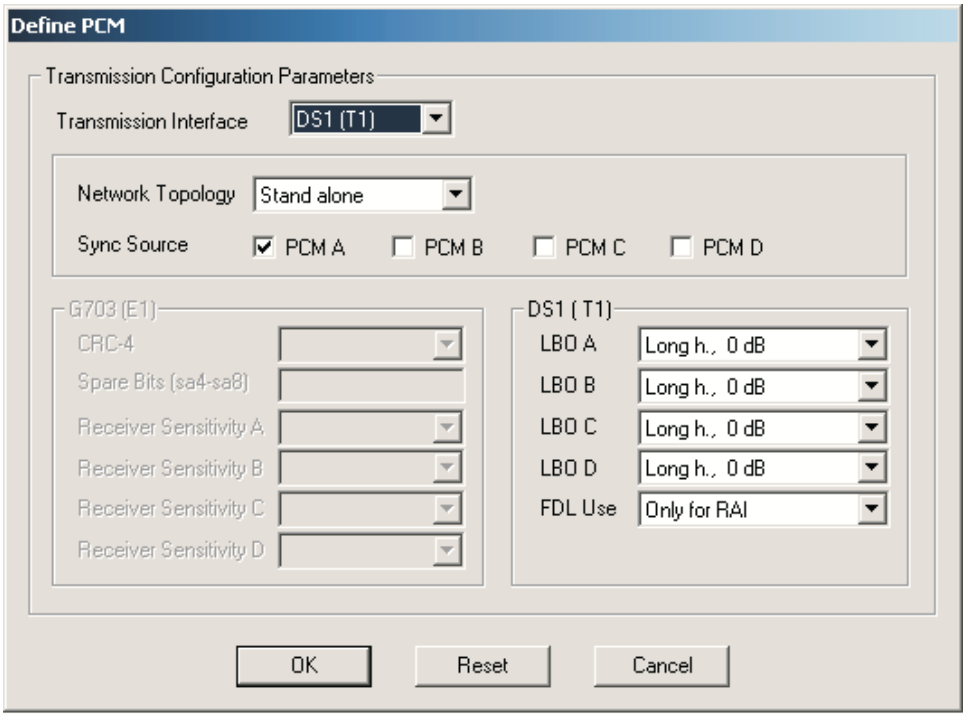


Figure 52 Defining Transmission Parameters

2. Set the parameters according to the table and instructions below.
3. Click **OK** when all parameters are set.

Table 33 PCM Parameter Settings for Transmission Interface T1, Short Haul

PCM Parameter	Setting
Sync Source	*See Site Installation Documentation*
Transmission Interface	DS1(T1)
Network Topology	*See Site Installation Documentation*
LBO A	*See instructions below*
LBO B	
LBO C	
LBO D	
FDL Use	*See Site Installation Documentation*

The instructions below describe how to calculate the LBO parameters.

Note: Ports C and D can also be used as a multidrop pair.

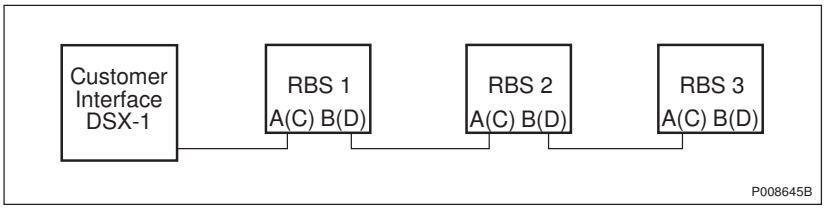


Figure 53 System View for Transmission Interface T1, Short Haul

1. Determine the length of the cable between the RBS and the customer interface (the cross-connection point DSX-1). *See figure above.*

   If multidrop is used, then calculate the attenuation of the entire RBS chain, since LBO A (C) is determined by the total attenuation of the chain. LBO B (D) is determined by the total attenuation to the last RBS in the chain.

   If the cable length is not known, then set the LBO parameters to ‘‘Short h., 0 – 133 feet’’.

2. Use the cable length and the table below to set the correct LBO parameters in the OMT.

Table 34 Setting LBO Parameters to Short Haul in OMT

Cable Length		LBO Setting
Feet	**Metres**	**(in the OMT)**
0 – 133	0 – 40	Short h., 0 – 133 feet
133 – 266	40 – 81	Short h., 133 – 266 feet
266 – 399	81 – 122	Short h., 266 – 399 feet
399 – 533	122 – 162	Short h., 399 – 533 feet
533 – 655	162 – 200	Short h., 533 – 655 feet

3. Set unused ports to ‘‘Short h., 0 – 133 feet’’.

Example of an LBO Parameters Calculation for Short Haul

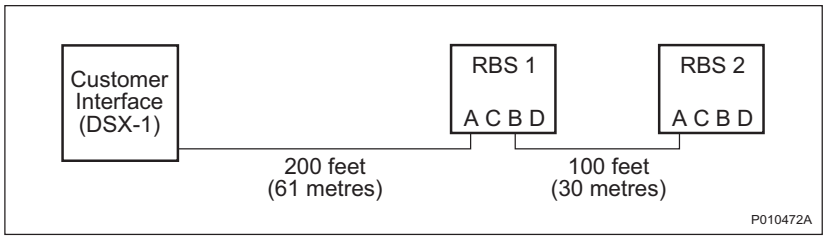


Figure 54 Calculating LBO Parameters for Short Haul

```
In this example, customer interface (DSX-1),
RBS 1 and RBS 2 refer to the figure above.

RBS 1:

The cable length between RBS 1 and the customer interface
(DSX-1) is 200 feet (61 m).

1.    Set LBO A for RBS 1 to "Short h., 133 - 266 feet".
      See the table above
2.    Set LBO B for RBS 1 to "Short h., 0 - 133 feet".
3.    Set LBO C and D (not connected) for RBS 1 to
      "Short h., 0 - 133 feet".

RBS 2:

The cable length between RBS 2 and the customer interface
(DSX-1) is 300 feet (200 + 100 feet) (91 m).

1.    Set LBO A for RBS 2 to "Short h., 266 - 399 feet".
      See the table above.
2.    Set LBO B, C and D (not connected) for RBS 2 to
      "Short h., 0 - 133 feet".
```

Example 6 Defining LBO Parameters as Short Haul

Defining LBO Parameters as Long Haul Manually

This section describes how to define LBO as long haul when the signal level at the customer interface and the cable attenuation are known.

Signal level at the customer interface means either the maximum input signal level at the Far End or the carrier advised code at the network interface. *See figure below.*

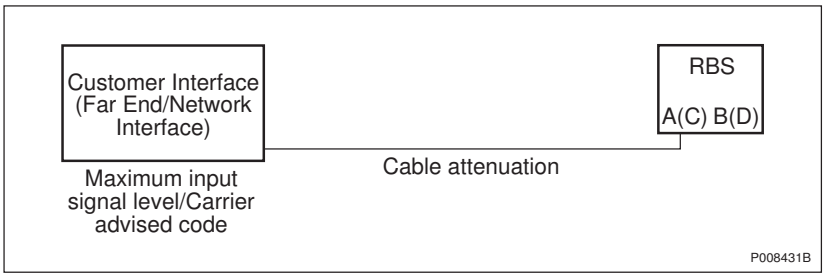


Figure 55 System Parameters for Defining LBO Parameters to Long Haul

1. On the **Configuration** menu, click **Define** and **PCM** to open the Define PCM window. *See figure below.*

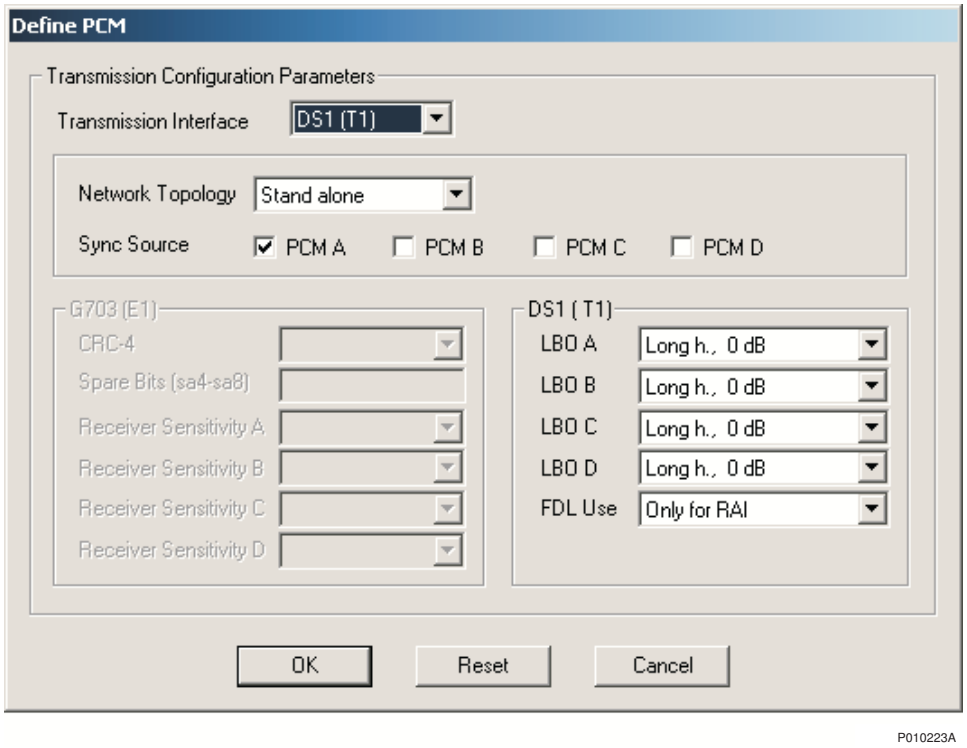


Figure 56 Defining Transmission Parameters

2. Set the parameters according to the table and instructions below.

3. Click **OK** when all parameters are set.

Table 35 Manual PCM Parameter Settings for Transmission Interface T1, Long Haul

PCM Parameter	Settings
Transmission Interface	DS1(T1)
Network Topology	*See Site Installation Documentation.*
Sync Source	*See Site Installation Documentation.*
LBO A	*See instructions below*
LBO B	
LBO C	
LBO D	
FDL Use	*See Site Installation Documentation.*

The instructions below describe how to set the LBO parameters manually to long haul.

Note: It is also possible to use ports C and D as a multidrop pair.

1. If the carrier advised code is given in the *Site Installation Documentation*, then use the table below to set the correct A (B, C, D) LBO parameters.

   If multidrop is used, then calculate the attenuation of the entire RBS chain, since LBO A (C) is determined by the total attenuation of the chain.

Table 36 Long Haul Parameters for Different Carrier Advised Codes at the Network Interface

Cable Attenuation (dB)	Long Haul Parameters for Different Values of the Carrier Advised Code at the Network Interface			
	A (0 dB)	B (-7.5 dB)	C (-15 dB)	D (-22.5 dB)
0 – 7.5	0	-7.5	-15	-22.5
7.5 – 15	N/A	0	-7.5	-15
15 – 22.5	N/A	N/A	0	-7.5
> 22.5	N/A	N/A	N/A	0

2. If the maximum input signal level is given in the *Site Installation Documentation*, use the table below to set the correct LBO A (B, C, D) parameters.

Table 37 Long Haul Parameters for Different Maximum Input Signal Levels

Cable Attenuation (dB)	**Long Haul Parameters for Different Values of the Maximum Input Signal Level at the Far End**			
	0 dB	**-7.5 dB**	**-15 dB**	**-22.5 dB**
0 – 7.5	0	-7.5	-15	-22.5
7.5 – 15	0	0	-7.5	-15
15 – 22.5	0	0	0	-7.5
> 22.5	0	0	0	0

3. If multidrop is used, then set LBO B (D) to ''Long h., 0 dB''. Used B (D) ports in multidrop configurations should always be set to ''Long h., 0 dB''

4. Set unused ports to ''Short h., 0 – 133 feet''. Unused ports should always be set to ''Short h., 0 – 133 feet''.

Example of a Manual LBO Parameters Calculation for Long Haul

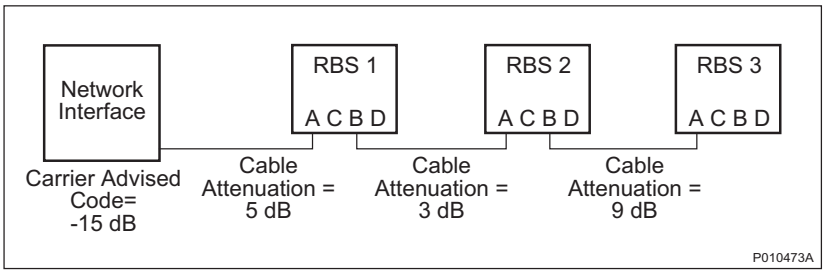


Figure 57 Calculating LBO Parameters Manually for Long Haul

```
In this example, network interface, RBS 1,
RBS 2 and RBS 3 refer to the figure above.

RBS 1:

Carrier advised code at the network interface is
"C" (-15 dB) and the cable attenuation is 5 dB.
1.    See the table Long haul parameters for different
      carrier advised codes at the network interface to
      find the correct LBO parameter for LBO A.
2.    Set LBO A to "Long h., -15 dB".
3.    Set LBO B to "Long h., 0 dB".
4.    Set LBO C and D (not connected) to
      "Short h., 0 - 133 feet".

RBS 2:

The cable attenuation between RBS 1 and RBS 2 is 3 dB.
1.    Calculate the total cable attenuation between RBS 2
      and the network interface:
      5 + 3 = 8 dB
2.    See the table Long haul parameters for different
      carrier advised codes at the network interface
      to find the correct LBO parameter for LBO A.
3.    Set LBO A to "Long h., -7.5 dB".
4.    Set LBO B to "Long h., 0 dB".
5.    Set LBO C and D (not connected) to
      "Short h., 0 - 133 feet".

RBS 3:

The cable attenuation between RBS 2 and RBS 3 is 9 dB.
1.    Calculate the total cable attenuation for RBS 3
      and the network interface:
      5 + 3 + 9 = 17 dB
2.    See the table Long haul parameters for different
      carrier advised codes at the network interface
      to find the correct LBO parameter for LBO A.
3.    Set LBO A to "Long h., 0 dB".
4.    Set LBO B, C and D (not connected) to
      "Short h., 0 - 133 feet"
```

Example 7 Calculating LBO Parameters Manually for Long Haul

Defining LBO Parameters as Long Haul Automatically

This section describes how to define LBO to long haul when the maximum input signal level at the Far End is known, but not the cable attenuation. The cable attenuation can be measured by the RBS according to the instructions below. *See figure below.*

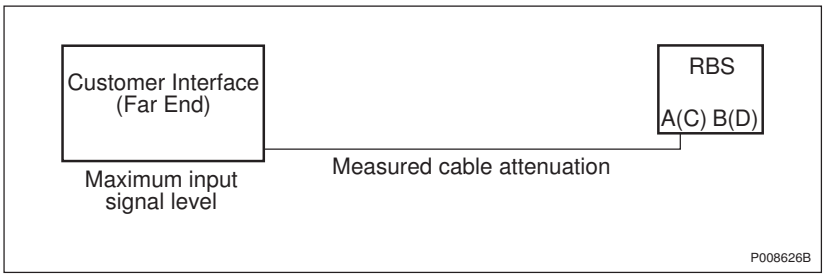


Figure 58 System Parameters for Defining LBO Parameters Automatically to Long Haul

1. On the **Configuration** menu, click **Define** and **PCM** to open the Define PCM window. *See figure below*.

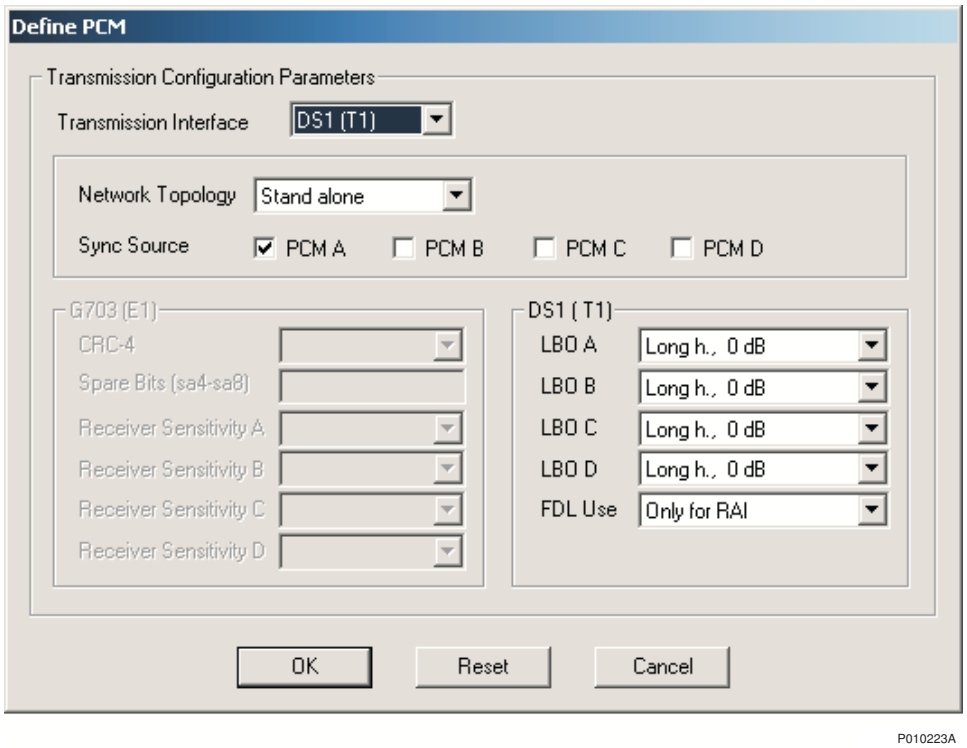


Figure 59 Defining Transmission Parameters

2. Use the table and instructions below to set the parameters.

3. Click **OK** when all parameters are set.

Table 38 PCM Parameter Settings for Transmission Interface T1, Long Haul Automatically

PCM Parameter	Setting
Transmission Interface	DS1(T1)
Network Topology	*See Site Installation Documentation*.
Sync Source	*See Site Installation Documentation.*
LBO A	*See instructions below*
LBO B	
LBO C	
LBO D	
FDL Use	*See Site Installation Documentation.*

The instructions below describe how to set the PCM parameters automatically.

For RBS 1 only:

1. Set LBO A (C) to ''Long h. ALBO, <value of the maximum input signal level> dB''.

2. If stand-alone, then set unused ports to ''Short h., 0 – 133 feet''. Unused ports are always set to ''Short h., 0 – 133 feet''.

   The RBS automatically sets the correct value in the IDB when the IDB is installed.

Note: The following instructions are for multidrop only.

If multidrop is used, the line attenuation for RBS 1 must be measured according to the instructions below.

For RBS 1:

1. Set LBO B (D) to ''Long h., 0 dB''. Used B (D) ports in multidrop are always set to ''Long h., 0 dB''.

2. On the **RBS 2000** menu, click **Connect**.

3. On the **Configuration** menu, click **Install IDB**.

   The RBS automatically sets the correct value in the IDB.

   The RBS remains in Local mode after the IDB has been installed.

4. On the **Maintenance** menu, click **Monitor**.

5. In the Available monitors box, select ''Line Attenuation for PCM-A'' (C) and click → to add ''PCM'' in the Monitors to start box. *See figure below.*

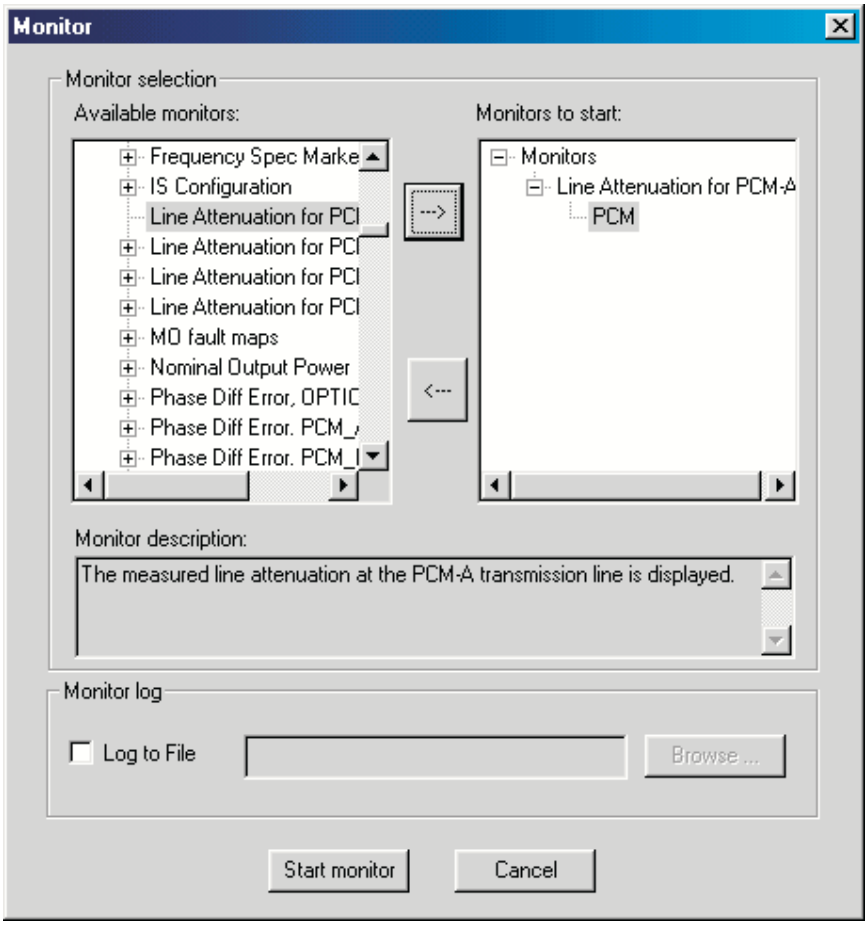


Figure 60 Monitoring Cable Attenuation

6. Click on **Start Monitor** and read the value of the cable attenuation. The displayed value is given in deci dB (10 deci dB = 1 dB). Make a note of the value in the test record.

When configuring the IDB for RBS 2 and RBS 3, follow the instructions below.

For RBS 2 and RBS 3:

7. Set LBO A (C) on RBS 2 (RBS 3) to ‘‘Long h. ALBO, 0 dB’’.

8. On the **Configuration** menu, click **Install IDB**.

9. On the **Maintenance** menu, click **Monitor**.

10. In the Available monitors box, select ‘‘Line Attenuation for PCM-A’’ (C) and click → to add ‘‘PCM’’ in the Monitors to start box.

11. Click on **Start Monitor** and read the value of the cable attenuation. The displayed value is given in deci dB (10 deci dB = 1 dB). Make a note of the value in the test record.

12. Add the measured cable attenuation values. The value given by Lin Att PCM A (C) is the cable attenuation to the previous RBS in the chain, so the measured value must be added to the value for the previous RBS(s) to obtain the total cable attenuation for the RBS in question.

13. Use the total cable attenuation value to find the long haul parameter value for LBO A (C) in the table below.

Table 39 Long Haul Parameters for Different Maximum Input Signal Levels

Cable Attenuation (dB)	**Long Haul Parameters for Different Maximum Input Signal Levels at the Far End**			
	0 dB	**-7.5 dB**	**-15 dB**	**-22.5 dB**
0 – 7.5	0	-7.5	-15	-22.5
7.5 – 15	0	0	-7.5	-15
15 – 22.5	0	0	0	-7.5
> 22.5	0	0	0	0

14. If there is another RBS in the chain, then set LBO B (D) to ‘‘Long h., 0 dB’’. Used B (D) ports in multidrop configurations should always be set to ‘‘Long h., 0 dB’’.

    If this is the last RBS in the chain, then set LBO B (D) to ‘‘Short h., 0 – 133 feet’’. Unused ports are always set to ‘‘Short h., 0 – 133 feet’’.

15. If there is another RBS in the chain, then repeat steps 7 to 14.

Example of an Automatic LBO Parameters Calculation for Long Haul

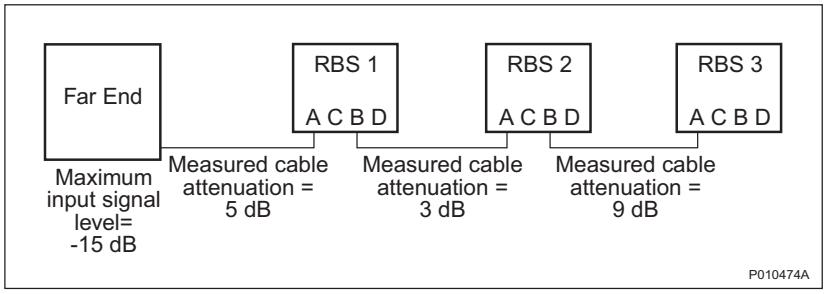


Figure 61 Calculating LBO Parameters Automatically for Long Haul

In this example, Far End, RBS 1, RBS 2 and RBS 3
refer to the figure above.

Maximum input signal level at the Far End is -15 dB.
The cable attenuation is not known.

RBS 1:
1. Set LBO A to "Long h. ALBO, -15 dB".

The cable attenuation is measured by the RBS to 5 dB.

2. The value of LBO A is set automatically by the RBS.
3. Set LBO B to "Long h., 0 dB".
4. Set LBO C and D (not connected) to "Short h., 0 - 133 feet'

RBS 2:

1. Set LBO A to "Long h. ALBO, 0 dB".

The cable attenuation between RBS 1 and RBS 2 is measured
to 3 dB by RBS 2.

2. Add the two measurements to obtain the total cable
attenuation for RBS 2:
5 + 3 dB = 8 dB
3. See the table above to find the correct
LBO parameter for LBO A.
4. Set LBO A to "Long h., -7.5 dB".
5. Set LBO B to "Long h. 0 dB".
6. Set LBO C and D (not connected) to
"Short h., 0 - 133 feet".

RBS 3:

1. Set LBO A to "Long h. ALBO, 0 dB".

The cable attenuation between RBS 2 and RBS 3 is measured
to 9 dB by RBS 3.

2. Add the three measurements to obtain the total cable
attenuation for RBS 3:
5 + 3 + 9 dB = 17 dB
3. See the table above to find the correct
LBO parameter for LBO A.
4. Set LBO A to "Long h., 0 dB".
5. Set LBO B, C and D (not connected) to
"Short h., 0 - 133 feet".

Example 8 Calculating LBO Parameters Automatically for Long Haul

Defining LBO Parameters when Transmission Characteristics are Unknown

This section describes how to define the LBO parameters if none of the following parameters are known: carrier advised code, maximum input signal at the customer interface, cable attenuation or cable length.

1. On the **Configuration** menu, click **Define** and **PCM** to open the Define PCM window. *See figure below.*

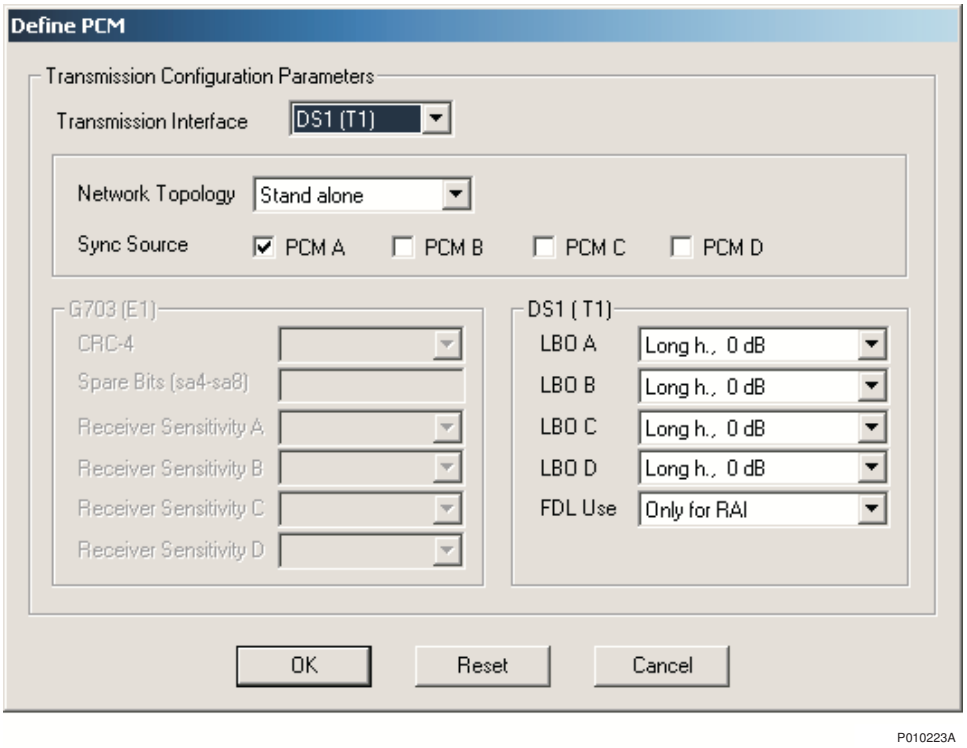


Figure 62 Defining Transmission Parameters

2. Set the parameters according to the table below.

3. Click **OK** when all parameters are set.

Table 40 PCM Parameter Settings for Transmission Interface T1, Transmission Characteristics Unknown

PCM Parameter	Settings
Transmission Interface	DS1(T1)
Network Topology	*See Site Installation Documentation.*
Sync Source	*See Site Installation Documentation.*
LBO A	‘‘Long h., 0 dB’’

Table 40 PCM Parameter Settings for Transmission Interface T1, Transmission Characteristics Unknown

PCM Parameter	Settings
LBO B	''Long h., 0 dB'', if used ''Short h., 0 – 133 feet'', if unused
LBO C	''Long h., 0 dB'', if used ''Short h., 0 – 133 feet'', if unused
LBO D	''Long h., 0 dB'', if used ''Short h., 0 – 133 feet'', if unused
FDL Use	*See Site Installation Documentation.*

7.6.13 Defining TEI

This section describes how to define the TEI value for the IXU.

1. On the **Configuration** menu, click **Define** and **TEI** to open the Define TEI dialog box.
2. Click **Run** to open the Define TEI for IXU 0 window.
3. Enter the TEI value found in the *Site Installation Documentation*. Click **OK**.

7.6.14 Defining TNOM

This section describes how to define the Transport Network Operation and Maintenance (TNOM) parameters if supported by the network.

1. On the **Configuration** menu, click **Define** and **TNOM** to open the Define TNOM window.
2. Set TNOM Use to ''On''.
3. In the TNOM Timeslot box, enter a valid time slot value:

   – 1 — 24 (default value 24), T1

   – 1 — 31 (default value 31), E1

4. In the TNOM Node ID box, enter the correct values. Valid TNOM Node ID values are 1 – 65534 (default value is 1). Click **OK** when finished.

7.6.15 Installing IDB

This section describes how to install the IDB in the RBS, by connecting the OMT to the RBS and loading the IDB from the PC to the RBS.

Note: The RBS must be in Local Mode in order to accept a new or modified IDB.

1. Physically connect the OMT to the RBS if not already connected. *See Section 7.6.1 Connecting OMT on page 111*.

2. On the **RBS 2000** menu, click **Connect** to connect the OMT logically to the RBS.

3. On the **Configuration** menu, click **Install IDB**.

   If the OMT detects inconsistencies between the RBS HW and the IDB, then the differences will be displayed in a window. However, the IDB in the RBScan still be overwriten if an RBS/IDB inconsistency has been detected. The IXU and RRUs remain in Local Mode after the IDB has been installed.

4. On the **Configuration** menu, click **Site Specific Data** and **Display** to open the site_specific_data.txt - window. Check that the correct parameters have been defined.

7.7 Reading Fault Status

This section describes how to read the fault status, using the OMT. If any fault indicator on the RBS is on, fault status must be read.

1. Read the IDB if it has not already been read. *See Section 7.6.2 Reading IDB on page 112*.

2. On the **Maintenance** menu, click **Monitor** to open the Monitor window. *See figure below.*

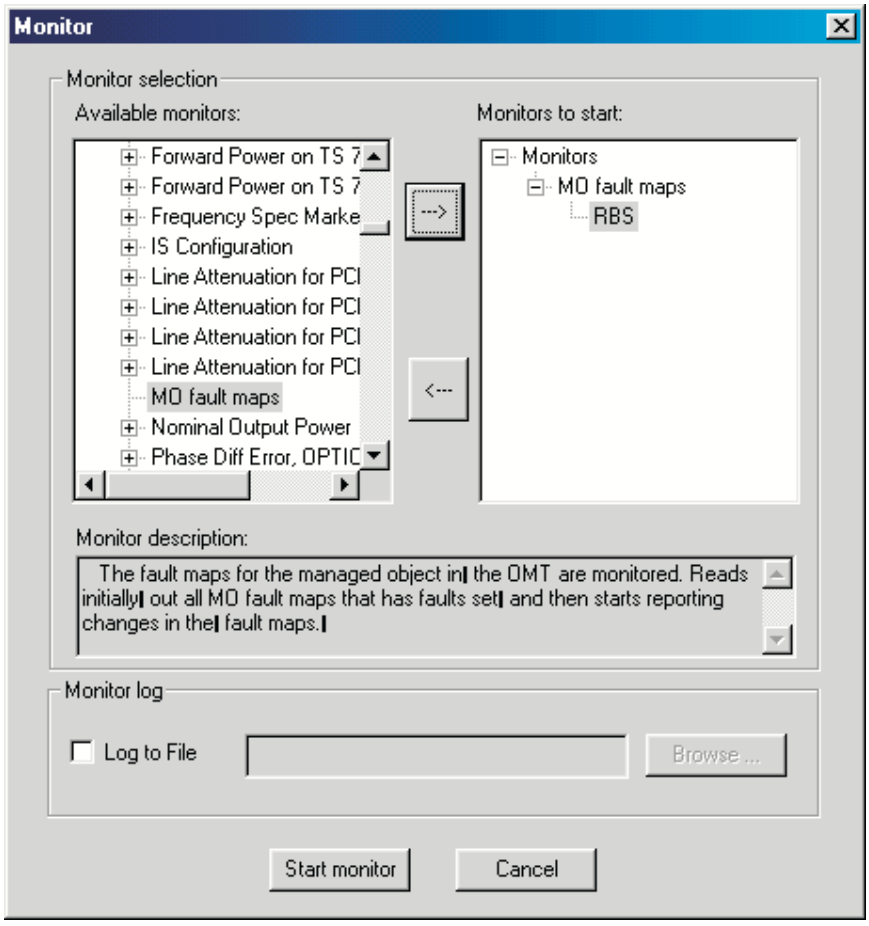


Figure 63 Reading Fault Status

3. In the Available monitors box, select "MO fault maps" and click → to add "RBS" into the Monitors to start box.

4. Click **Start monitor**.

5. In the RBS Event Monitor window, check the MO faults box to see if there are any faults. If there are, then correct these before continuing.

   When an MO fault is selected, corresponding fault description, action and related faults are displayed. See also *Appendix Fault List*.

6. Close the RBS Event Monitor window.

7.8 Testing External Alarms

This section describes how to use the OMT to test that all external alarms, if used, are recognized and handled correctly. The test is passed when all alarms are recognized.

Note: The alarms must be individually identifiable in the OMT. There must be no doubt which alarm was indicated. The alarm message must be unique for each alarm.

1. On the **Maintenance** menu, click **Monitor** to open the Monitor window. *See figure below.*

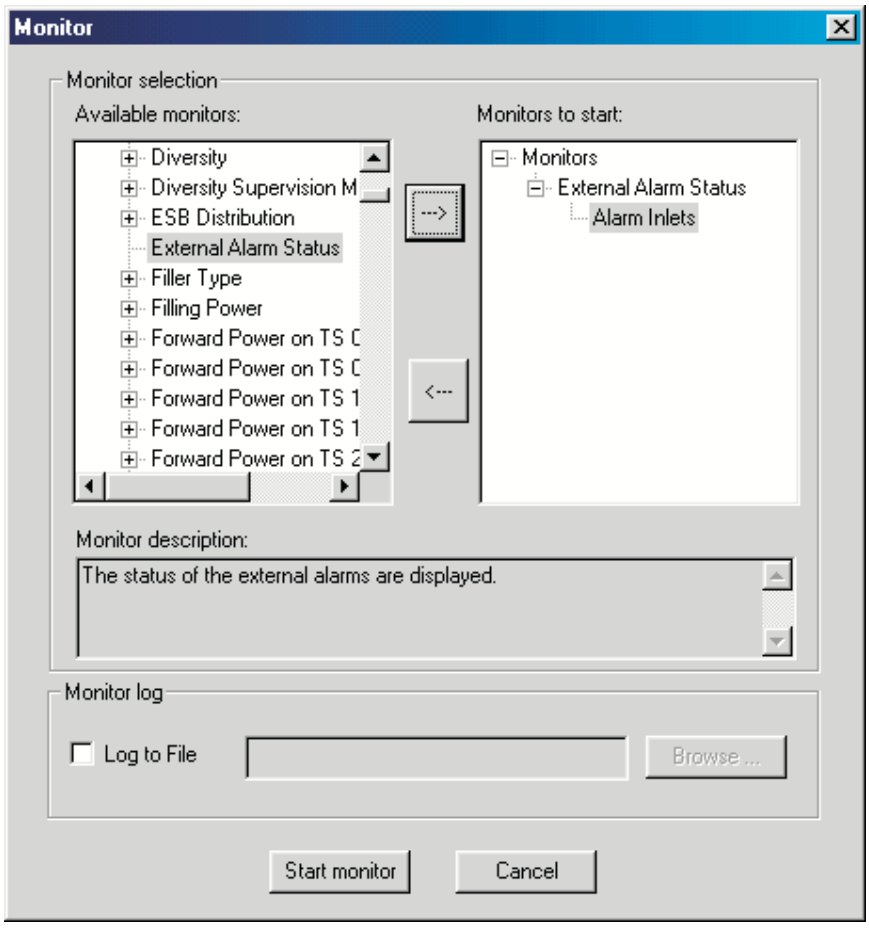


Figure 64 Testing External Alarms

2. In the Available monitors box, select ''External Alarm Status'' and click → to add ''Alarm Inlets'' in the Monitors to start box.

3. Click **Start monitor**.

4. Trigger the desired alarm by either shorting or breaking it.

Note: Test the alarms in numerical order, and always start with alarm 1.

5. Check that the appropriate alarm appears in the RBS Event Monitor window.

6. Release the trigger on the alarm and check that the alarm disappears from the OMT.

7. Repeat steps 5 to 7 for all defined external alarms.

8. Close the RBS Event Monitor window when finished.

7.9 Performing Concluding Routines

This section describes the actions to take before leaving the site and provides a site checklist. It also contains a test record.

7.9.1 Saving IDB

In case it is necessary to re-install the IDB, the IDB parameters must be saved on the PC.

1. On the **Configuration** menu, click **Save IDB**.

2. Give the IDB file an RBS-specific name and save the IDB on the PC.

7.9.2 Checking RRU and IXU Indicators

1. Ensure that all lids are closed and fastened with screws.

2. Set the RRU and IXU in remote mode by pressing the **Local/Remote** button.

3. Check that the RRU and IXU indicators have the status shown in the applicable table below:

- Table 41 on page 142 shows the approved status of the RRU and IXU indicators when the RBS is in remote mode but not connected to the BSC.

- Table 42 on page 142 shows the approved status of the RRU and IXU indicators when the RBS is in remote mode, fully operational, and connected to the BSC.

Table 41 RRU and IXU Indicators After Site Installation Tests Without BSC Connection

RBS in remote mode and no BSC connected			
RRU		**IXU**	
Fault	Off	Fault	Off
Operational	Off	Operational	Off
Local	Flashing	Local	Flashing
RF off	On	RBS fault	Off
AC power on	On(1)	External alarm	Off
DC power on	On(1)	AC power on	On(1)
RRU temp.	Off	DC power on	On(1)
		IXU temp.	Off
		Transmission OK	On/Off(2)

(1) Depending on power system configuration.

(2) A, B, C, and/or D, depending on transmission configuration.

Table 42 RRU and IXU Indicators After Site Installation Tests With BSC Connection

RBS in remote mode, fully operational and connected to the BSC			
RRU		**IXU**	
Fault	Off	Fault	Off
Operational	On	Operational	On
Local	Off	Local	Off
RF off	On/Off(1)	RBS fault	Off
AC power on	On(2)	External alarm	Off
DC power on	On(2)	AC power on	On(2)
RRU temp.	Off	DC power on	On(2)
		IXU temp.	Off
		Transmission OK	On(3)

(1) Depending on BSC.

(2) Depending on power system configuration.

(3) A, B, C, and/or D, depending on transmission configuration.

4. If the Operational indicator on the RRU and/or IXU is flashing, SW is being downloaded from the BSC. Wait until downloading is complete.

5. If the Local indicator on the RRU and/or IXU does not have the correct status, press the **Local**/**Remote** button to switch status.

6. If RBS site integration is not performed immediately after site installation tests, then close the sunshields.

7.9.3 Completing Test Record

This section contains a test record. It is recommended to fill in the test record during the testing procedure.

Test Record for Stand-alone Tests

NE Commissioning GSM -

Date	Site
Site No	Cell
RBS type	Tester's Name

NE STAND ALONE TEST

		Remark
Antenna System Test Record	☐	
Cable connections inspected	☐	
Power supply verified	☐	
Fan Unit Tested (If Applicable)	☐	
IDB parameters set	☐	
Fault status read	☐	
External Alarms tested	☐	

Notes:

P010243C

Figure 65 Test Record for Site Installation Tests

7.9.4 Filling in Checklist

The following checklist is not mandatory but strongly recommended. Local procedures and safety regulations must be evaluated and included in this checklist.

Table 43 Checklist

	Check the following:	OK
1	The indicators on the RRU and the IXU are in the approved status.	
2	The test equipment has been disconnected from the RBS	
3	The RBS cabinet and the mounting base are free from foreign objects.	
4	All cabinets and cables are free of damage.	
5	All EMC sealants and cable penetrations are intact.	
6	Top and bottom of cabinet are free of obstructions (for airflow).	
7	The cabinet has been locked, and the screws have been tightened.	
8	All tools have been accounted for.	
9	All paperwork has been completed.	

8 RBS Site Integration

This chapter describes how to integrate the RBS with the BSC into the GSM network, and the tests used to verify the integration.

Integration is carried out with the RBS connected to a PCM link and in close co-operation with a BSC operator.

All results must be documented in the test record.

Preconditions at the RBS Site

This section describes the preconditions for personnel at the RBS site before integrating the RBS.

Before starting the integration at the RBS site, ensure the following:

- The test record for Antenna System Tests has been completed
- The test record for Site Installation Tests has been completed
- The RBS commissioning personnel are in contact with the BSC operator
- The RBS commissioning personnel and the BSC operator have agreed on the following parameters:
  - BCCHNO parameters
  - DCHNO parameters
  - BSIC parameters
  - Time slots (TS) used for SDCCH

Preconditions at the BSC

This section describes the preconditions for personnel at the BSC before integrating the RBS.

Before starting the integration at the BSC, ensure the following:

- The test record for Network Element (NE) has been completed
- The test record for Integration of MSC/VLR has been completed
- The BSC operator is in contact with the RBS commissioning personnel
- The BSC operator and the RBS commissioning personnel have agreed upon the following parameters:

- BCCHNO parameters
- DCHNO parameters
- BSIC parameters
- Time slots (TS) used for SDCCH

Work Process for RBS Site Integration

This section describes the order in which to perform the integration and tests. Each section should be completed and the results written in the test record before moving on to the next step in the process. *See Figure below*.

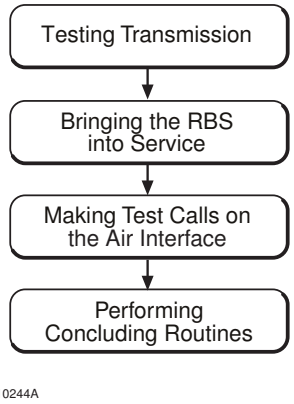


Figure 66 Work Process for RBS Site Integration

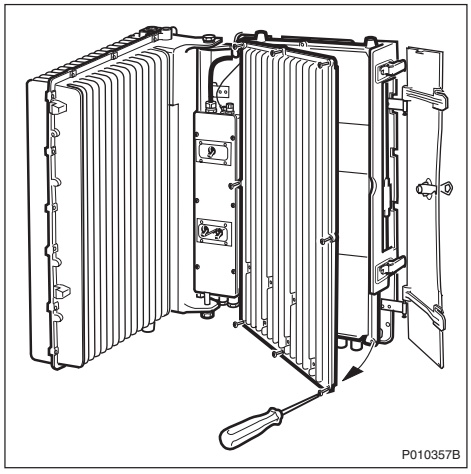
The work order can be altered, or tests can be removed due to local circumstances. However, before any such changes are made, an investigation of the consequences must be carried out. If the work order is changed or tests are removed, the department responsible for this manual must be notified and agree to the changes, or the responsibility is automatically transferred to the person making the decision.

8.1 Testing Transmission

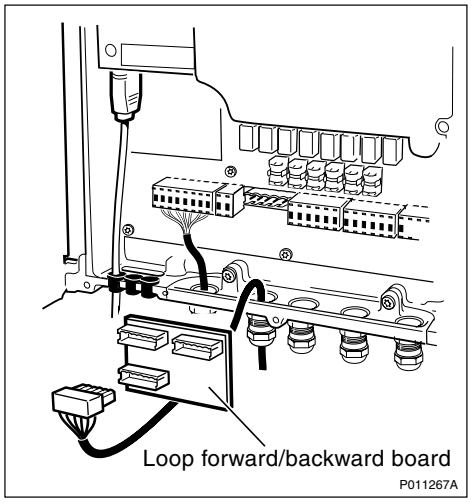
8.1.1 Transmission Test on E1

This section describes how to test transmission, when the E1 transmission interface is used.

1. Open the RRU, and the IXU cover.



2. Remove the PCM cable plug, starting with position A, and connect it to the Loop Back socket on the Loop forward/backward board.



3. Request that the BSC operator checks the Digital Path on the active RBLT.

4. Remove the PCM cable plug from the Loop forward/backward board and reconnect it to the socket in the IXU.

5. Wait for the BSC operator to confirm that the Abis Paths are correctly defined and that the Digital Path between the BSC and the RBS is working properly.

6. Repeat steps 2 to 5 for all used PCM lines.

7. Enter Pass/Fail in the test record, *see Section 8.4.2 Filling in the Test Record on page 157*.

8.1.2 Transmission Test on T1

This section describes how to test transmission, when the T1 transmission interface is used.

Note: Transmission test on T1 can also be performed in the same way as E1, according to *Section 8.1.1 on page 148*.

1. Request that the BSC operator uses CSU functions.
2. Configure the RBS for CSU, using OMT, and restart the RBS.

For more information regarding CSU ANSI, see:

BSS R11 Software Reference Manual *EN/LZT 720 0047*

1. Wait for the BSC to check the Digital Path on the active RBLT.
2. Deactivate CSU functions in the RBS, using OMT and restart the RBS.
3. Wait for the BSC operator to check that the Abis Paths are correctly defined and that the Digital Path between the BSC and the RBS works properly.
4. Enter Pass/Fail in the test record, *see Section 8.4.2 Filling in the Test Record on page 157*.

8.2 Bringing the RBS into Service

This section describes how to bring the RBS into service.

Note: The BSC operator can bring the MOs into service and deblock them even when the RBS is in remote mode. (The RBS then responds directly to the BSC operator.)

1. Set the RBS in local mode by pressing the **Local**/**remote** button on the IXU.
2. Wait until the Local indicator has a steady yellow light, indicating that the RBS is in Local Mode.
3. Wait for the BSC operator to bring the MOs on each TRX into service logically and deblock them.
4. Press the **Local**/**Remote** button on the IXU. The Local indicator will start flashing.

The RBS now downloads and executes the commands previously prepared by the BSC operator. When the Local indicator turns off, the RBS is in remote mode.

5. Check that all RRUs are in Remote Mode by confirming that the Local indicator on each RRU is off.

6. If BTS PCM Supervision is used, then wait for the BSC operator to activate it and check that MO DP state is operational.

7. Wait for the BSC operator to activate and check the cell.

8.3 Making Test Calls on the Air Interface

This section describes how to make test calls on the air interface. The tests are performed from the RBS site to verify that all TSs on all TRXs work properly.

The test calls are performed by using a Test Mobile Station (TEMS). See *TEMS Investigation GSM Manual* in the *TEMS Kit*.

Note: It is important to test all TCH-TSs to ensure full capacity.

All the test calls should be made from a distance of at least 50 m (164 ft) from the antenna system. *See Figure below*.

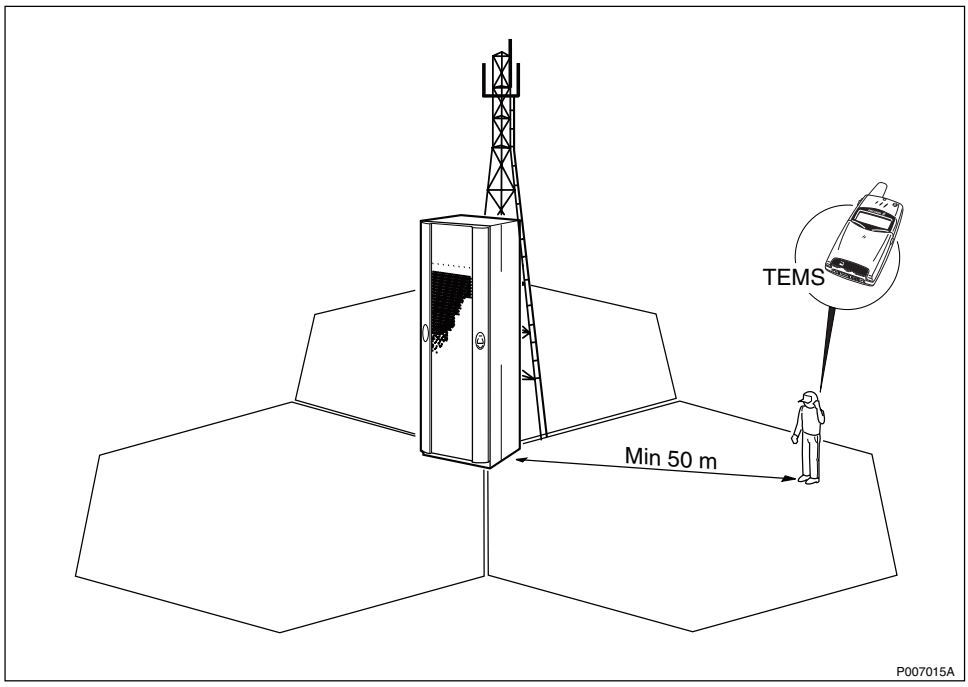


Figure 67 Test Call Using TEMS

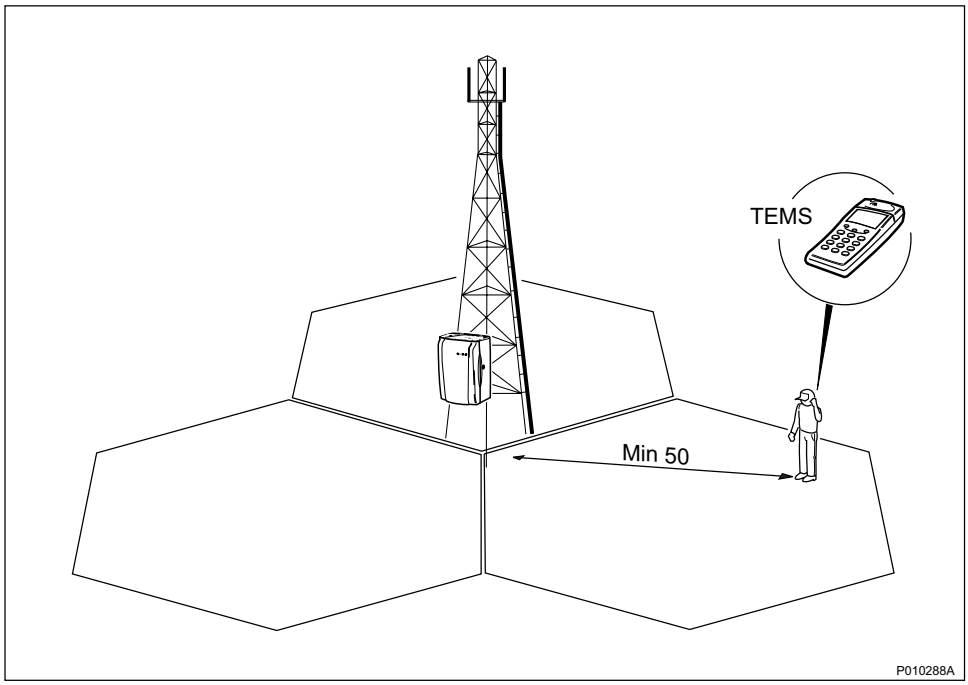


Figure 68 Distance From the Antenna System During Test Call Using TEMS

8.3.1 Making Test Call Using TEMS

This section describes how to make a test call using a TEMS and a PC with TEMS SW. The test confirms that all TSs on all TRXs work properly.

The test record should be completed during the test. *See Section 8.4.2 Filling in the Test Record on page 157*.

1. Connect the TEMS cable between the TEMS and the PC COM port 1 on the PC containing TEMS SW.

2. Start the TEMS and the TEMS SW.

For more information on the TEMS and TEMS SW, *see* :

	TEMS Investigation GSM Manual	*LZT 108 2684*

3. In the **Externals** menu, select **Enable Connections**. In the **External Connection** window, define the external connections according to *the table below.*

Table 44 Defining the External Connections

Definition	Port
MS1 Port	COM1
MS2 Port	N/A
Position Port	N/A

4. In the **Control** menu, select **Test of TCH**. Enter the following parameters:
   - Telephone number
   - Frequency (ARCFN)
   - Broadcast Channel (BCCH)
   - Frequency for the Traffic Channel (TCH)
5. Select the TSs used for traffic and click on **Add**. The BCCH and SDCCH channels are used for signalling and do not carry traffic. Do not make test calls on these TSs.

   Repeat this procedure for each TRX.
6. Click on the **Start** button. The TEMS now makes a test call on all selected TSs. For each TS, verify the speech quality and write ''Pass'' or ''Fail'' in the test record. *See Section 8.4.2 Filling in the Test Record on page 157*.

8.3.2 Making Diversity Test Call

This section describes how to make a diversity test call. The test confirms that both RXD A and RXD B work properly.

Note: If antenna diversity is not supported, do not make a diversity test call.

1. Wait for the BSC operator to configure RXD=A.
2. Request the BSC operator to block all TRXs except the one being tested and check that BCCH and SDCCH are configured.
3. Make a test call from the TEMS.
4. Request the BSC operator to check that the TCH being tested is busy. Check the speech quality, and write ''Pass'' or ''Fail'' in the test record. *See Section 8.4.2 Filling in the Test Record on page 157*.
5. Terminate the call.
6. Request the BSC to check that the tested TCH is released.
7. Repeat steps 2 to 6 for all TRXs in the cell.
8. Wait for the BSC operator to configure RXD=B.

9. Request the BSC operator to block all TRXs except for the one being tested, and check that BCCH and SDCCH are configured.
10. Make a test call from the TEMS.
11. Request the BSC operator to check that the TCH being tested is busy. Verify the speech quality and write ''Pass'' or ''Fail'' in the test record. *See Section 8.4.2 Filling in the Test Record on page 157*.
12. Terminate the call.
13. Request the BSC to check that the tested TCH is released.
14. Repeat steps 9 to 13 for each TRX in the cell.
15. Wait for the BSC operator to restore the cell.

8.3.3 Making Test Call from the Fixed Network

This section describes how to make a test call from the fixed network. The test confirms that the cell is available from the fixed network.

1. Request the BSC operator to configure a TRX with BCCH and SDCCH.
2. Request the BSC commissioning staff to make a call from a fixed network phone to the TEMS.
3. Request the BSC operator to check that the TCH being tested is busy and verify the ARFCN and the TS displayed in the TEMS. Verify the speech quality and write ''Pass'' or ''Fail'' in the test record. *See Section 8.4.2 Filling in the Test Record on page 157*.
4. Terminate the call.

8.3.4 Making Handover Test Call

This section describes how to make a handover test call. The purpose of the test is to verify that handover between cells works properly and that the coverage of the cell is in accordance with the cell planning. If no handover takes place at cell borders, then the BSC personnel must be contacted.

Note: The handover test call must be made at least 50 m (164 feet) from the antenna system.

1. Make a test call using TEMS and a PC containing TEMS SW.
2. Move from one cell to another and verify that the call is not disconnected.
3. In the **Log** menu on the PC, select **Start Logging**. Give the log a unique name and select a destination for the log to be saved.
4. In the **Monitor** menu, select the **Status information** menu and **Serving + neighbouring cell**.

5. Monitor the signal strength (RxLev) and move through the cells to verify that handover takes place between cells at the cell borders. *See figure below*.

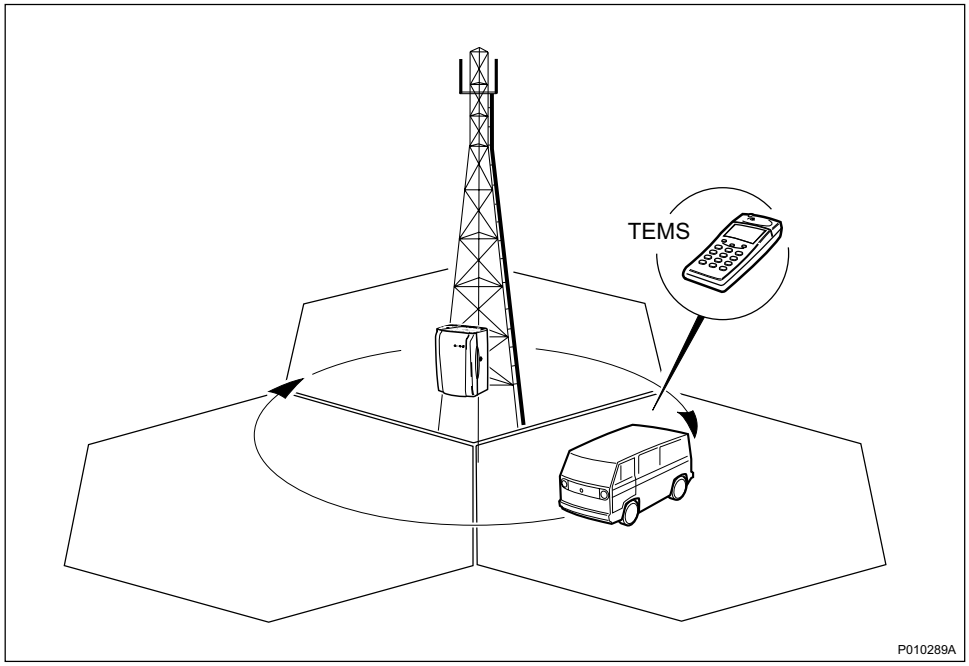


Figure 69 Verifying that Handover Takes Place at the Cell Borders

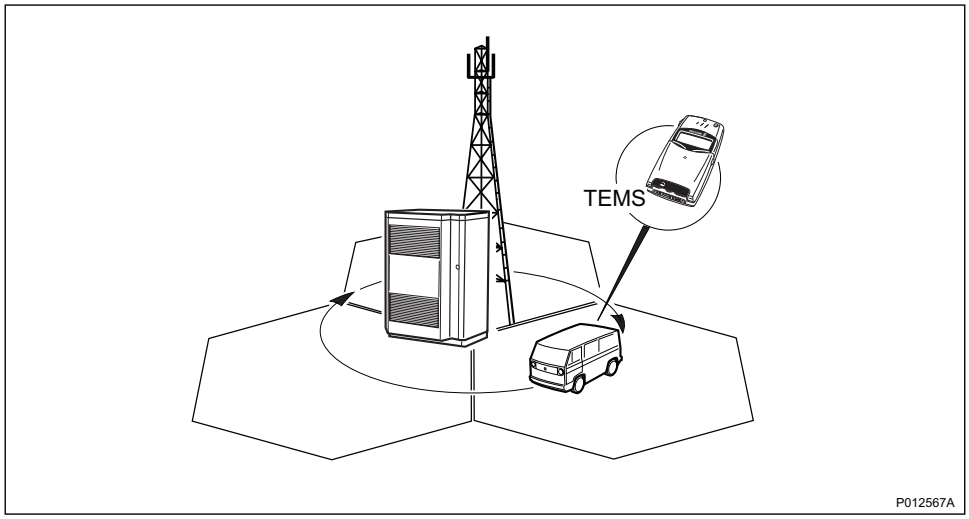


Figure 70 Verifying that Handover Takes Place at the Cell Borders

6. Write ''Pass'' or ''Fail'' in the test record. *See Section 8.4.2 Filling in the Test Record on page 157*.

7. Terminate the call and stop the log.

8.4 Performing Concluding Routines

This section describes the actions to be taken before leaving the site, and the test record to be completed during the tests.

8.4.1 Checking the RRU and IXU Indicators

This section describes how to check that the RRU and the IXU indicators show the correct status, when the RBS is connected to the BSC and is fully operational. The check should be performed before leaving the site.

1. Check that the indicators on the RRU(s) and the IXU have the status shown in the tables below:

Table 45 RRU Indicators After Site Integration

RRU Indicator	State
Fault	Off
Operational	On
Local	Off
RF off	Off
AC power on	On(1)
DC power on	On(1)
RRU temp.	Off

(1) Depending on power system configuration.

Table 46 IXU Indicators After Site Integration

IXU Indicator	State
Fault	Off
Operational	On
Local	Off
RBS fault	Off
External alarm	Off
AC power on	On(1)
DC power on	On(1)
IXU temp.	Off
Transmission OK	On(2)

(1) Depending on power system configuration.
(2) A, B, C and/or D, depending on transmission configuration.

8.4.2 Filling in the Test Record

This section contains the test record to be filled in during the integration and testing of the RBS.

RBS Site Integration GSM -

Date:	Site Name:
Site No.:	Cell Configuration:
RBS Type:	Tester's Name:

Transmission Test:

Port A	Port C	Port B	Port D

Test Call Using TEMS:

TRX	Cell ID	ARFCN	BSIC	TS0	TS1	TS2	TS3	TS4	TS5	TS6	TS7
0											
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											

Diversity Test Call (if Applicable):

RXD	TRX0	TRX1	TRX2	TRX3	TRX4	TRX5	TRX6	TRX7	TRX8	TRX9	TRX10	TRX11
A												
B												

Test Call from Fixed Network:

Pass/Fail	

Handover Test Call:

A to B	B to C	C to A	A to C	C to B	B to A

Remarks: _____

_____

_____

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Figure 71 Test Record for RBS Site Integration

8.4.3 Filling in the Checklist

This section describes the checklist to be filled in after the integration has been completed.

The following checklist is not mandatory but it is strongly recommended. Local procedures and safety regulations must be evaluated and included in this checklist.

Table 47 Checklist

Check the following:	**OK**
1. The indicators on the RRU and the IXU are in the approved status.	
2. The test equipment has been disconnected from the RBS.	
3. The RBS cabinet and the mounting base are free from foreign objects.	
4. All cables are free of damage.	
5. Top and bottom of cabinet are free of obstructions (for airflow).	
6. The cabinet has been locked, and the screws have been tightened.	
7. All tools have been accounted for.	
8. All paperwork has been completed.	

8.4.4 Network Element Acceptance Certificate

This section contains a Network Element Acceptance Certificate to be filled in by the person responsible. *See Figure below.*

NETWORK ELEMENT ACCEPTANCE CERTIFICATE

This is to certify that Ericsson AB has delivered, installed and tested the Network Element ..... as defined in contract .....

The Network element acceptance has been performed in accordance with the procedures described in the above mentioned contract. Further reference should be made to the acceptance documents. The Network element passed acceptance with remarks per attached test report.

Number of remarks within Ericsson´s responsibilities, that have been made on this site:.....

Date:.....

The Buyer	The Contractor
Company Name:	Company Name: Ericsson AB
Person Responsible:	Person Responsible:

P004631C

Figure 72 Example of a Network Element Acceptance Certificate

9 Maintenance

This chapter describes the maintenance procedures for the RBS 2308 and RBS 2309.

9.1 Introduction

9.1.1 Target Group

The target group for this document is maintenance personnel. To perform maintenance work in a safe and professional way, the work must be done by skilled personnel.

The following qualifications are minimum requirements:

- Good understanding of radio and telephone engineering
- Good understanding of engineering English

9.2 Preconditions

This section describes the preconditions that apply to the maintenance procedures, including tools and safety.

9.2.1 Health and Safety Information

Ensure that the chapters *Personal Health and Safety Instructions* and *System Safety Information* in this manual has been read and fully understood.

9.2.2 Tools

This section presents the recommended torque settings for screws, nuts and connectors.

Torque Values

Table 48 Screws and Nuts

Dimension	Torque Nm	Remark
M4	2.6 Nm +/- 0.15 Nm	Normal

Table 48 Screws and Nuts

M4	1.7 Nm +/- 0.15 Nm	Reduced torque for captive screw
M8	21 Nm +/- 1.3 Nm	Earth nut

Table 49 Connectors

Connector	Torque Nm	Remark
TNC	1.7 Nm +/- 0.15 Nm	—
N	2.7 Nm +/- 0.2 Nm	—

9.3 Fault Localisation Using OMT

This section contains information on how to localise a fault when handling an alarm in the OMT. Ericsson recommends that the OMT is used, but if no OMT is available, or it is not possible to connect to the RBS, *see Section 9.4 Troubleshooting Using the RBS Indicators on page 179*.

The section is based on the Replacement Unit Map (RU Map) connected to an alarm. The RU Map consists of two different kinds of RUs:

- Physical Units

  The following RUs are mapped to one single physical unit that can be replaced in the field.

  – IXU

  – TIM

  – RRU

  – Fan unit

- Logical units

  The following RUs are handled as one unit, but can actually be one or more physical units.

  – Antenna: The logical path from the RRU to (and including) the antenna

  – Battery: The battery backup system including batteries

  – Environment: External conditions (ambient temperature and site power)

  – GPS receiver: The synch. signal received and distributed by the GPS receiver

  – GPS receiver DXU cable: The logical link between the GPS receiver and the IXU

- IDB: The installation database stored in the RBS, not the physical storage
- Y Link: The logical link between IXU and RRU(s)

For supplementary information about RU maps, *see:*

Fault List Micro *EN/LZT 720 0466*

9.3.1 Reading Fault Status

This section describes how to read the fault status, using the OMT. If any fault indicator on the RBS is on, then the fault status must be read.

Connect the OMT

1. Remove the lid from the OMT port on the IXU.
2. Connect the OMT cable from the PC serial port 1 to the OMT port on the right-hand side of the IXU. If an extended OMT cable is connected to the OMT port, then connect the OMT cable to the end of the extended OMT cable.
3. Start the OMT

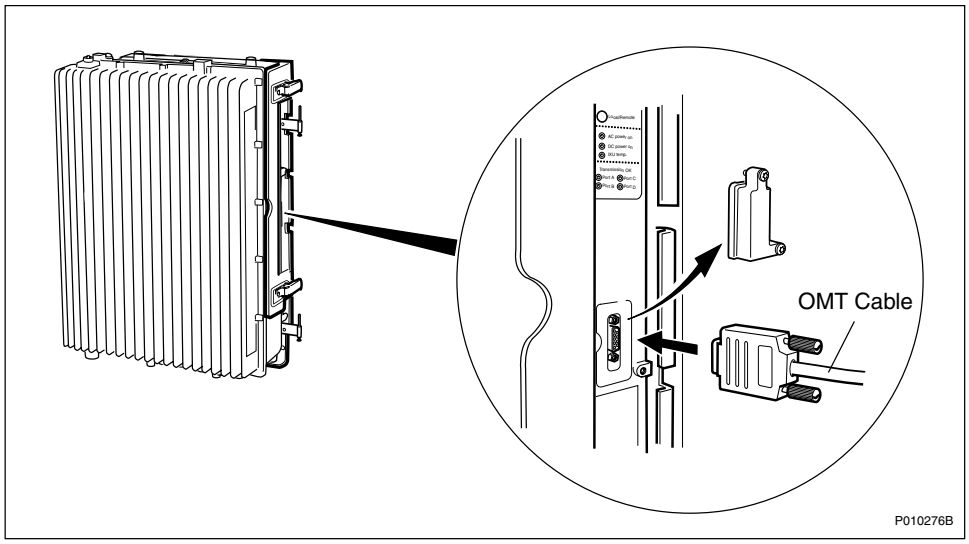


Figure 73 Connecting OMT to IXU

Reading the IDB

4. In the **RBS 2000** menu, select **Connect** to logically connect the OMT to the RBS.

5. In the **Configuration** menu, select **Read IDB**

6. On the **Maintenance** menu, click **Monitor** to open the Monitor window. *See figure below.*

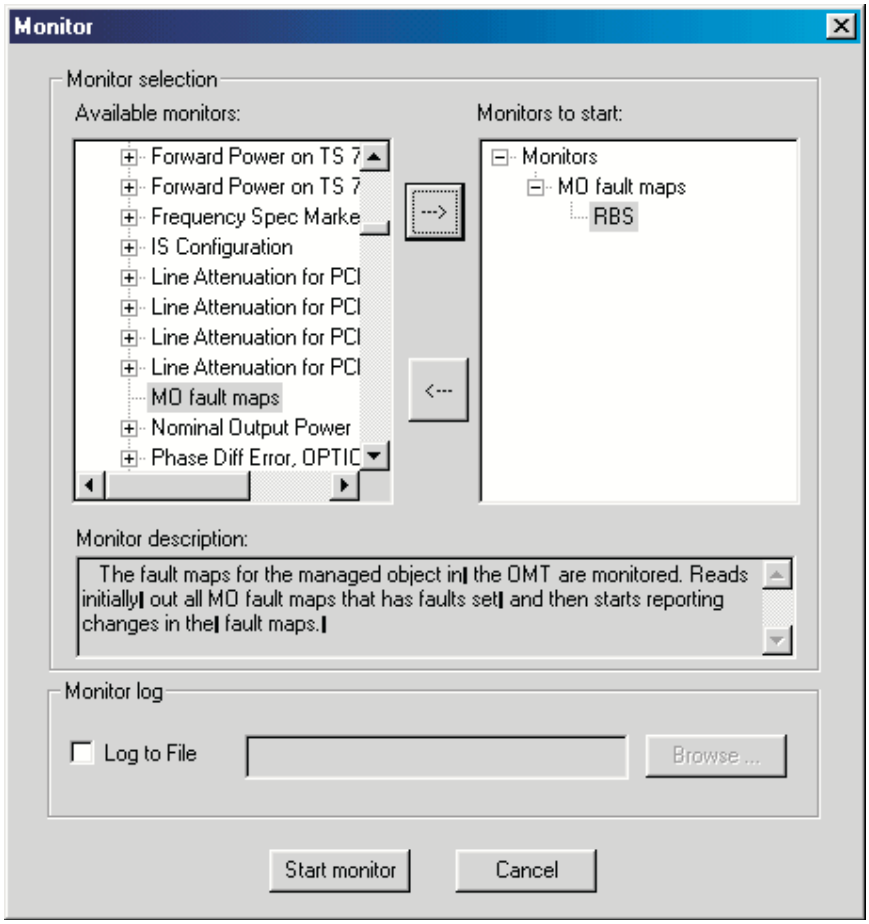


Figure 74 Reading Fault Status

7. In the Available monitors box, select ‘‘MO fault maps’’ and click → to add ‘‘RBS’’ into the Monitors to start box.

8. Click **Start monitor**.

9. In the RBS Event Monitor window, check the MO faults box to see if there are any faults. If there are, then correct these before continuing.

   When an MO fault is selected, corresponding fault description, action and related faults are displayed. See also *Fault List*.

10. When all faults are corrected, close the RBS Event Monitor window.

9.3.2 SO CF RU:0/ IXU

This section describes how to localise an SO CF RU:0/ IXU fault.

Related RUs

The RUs listed below have higher priority than the RU described in this section. If they are present, then proceed to the related section before handling this RU.

- If ''SO CF RU:34/ IDB'' appears in the OMT, then proceed with *Section 9.3.8 SO CF RU:34/ IDB on page 173*.
- If ''SO CF RU:3/ Y link'' appears in the OMT, then proceed with *Section 9.3.3 SO CF RU:3/ Y Link on page 165*.

Displaying Fault Information

Display fault information according to *Section 9.3.1 Reading Fault Status on page 163*

Perform the following actions step-by-step until the fault ceases:

Resetting IXU

1. Press the **IXU reset** button on the IXU interface panel.

Loading SW in the RBS

2. Load SW and IDB.
3. Replace the flash card, proceed with *Section 9.5.1 Flash Card Replacement on page 191*.

Replacing IXU

4. Replace the IXU, proceed with *Section 9.5.3 IXU Replacement on page 199*.

9.3.3 SO CF RU:3/ Y Link

This section describes how to localise an SO CF RU:3/ Y Link fault. The Y link cable is connected between the IXU and the RRU(s).

Related RUs

The RU listed below has higher priority than the RU described in this section. If it is present, proceed to the related section before handling this RU.

- If ''SO CF RU:34/ IDB'' appears in the OMT, proceed with *Section 9.3.8 SO CF RU:34/ IDB on page 173*.

Displaying Fault Information

Display fault information according to *Section 9.3.1 Reading Fault Status on page 163*.

Perform the following actions step-by-step until the fault ceases:

Checking IDB Configuration

1. In the OMT, ensure that the IDB is in accordance with the HW cabinet configuration.

Checking RRU Power

Perform the following actions step-by-step until the fault ceases, or until the RRU power is confirmed.

Note: This is only valid for an RRU connected to the Y link-generated alarm.

2. Check that the indicators **AC Power on**/**DC Power on** on the RRU interface panel are ON.

3. Open the RBS and check that the RRU power is switched on.

4. Check that the power cable from the MBU to the RRU is correctly connected.

5. Disconnect the power cable from the RRU and use a multimeter to check that the correct voltage is being supplied to the RRU, *see Figure and Table below*.

For more information about correct voltage, *see:*

	RBS 2308, RBS 2309, RBS 2109 and EBB-06 Hardware Reference Manual	*EN/LZT 720 0058*

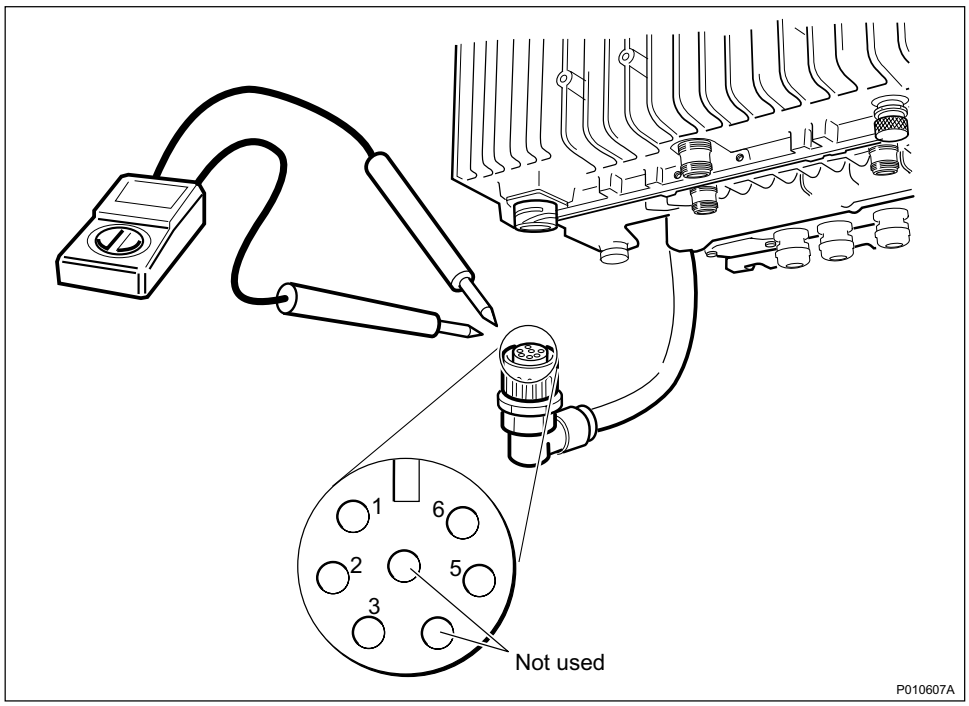


Figure 75 Measuring Voltage on RRU Power Cable

Table 50 Pins and Functions

Connector Pin	Function
1	DC_P
2	DC_N
3	PE
5	AC_L2
6	AC_L1

Resetting RRU

6. Press the **RRU reset** button on the RRU interface panel connected to the faulty Y link

Resetting IXU

7. Press the **IXU reset** button on the IXU interface panel

Checking Y Link Cable

Perform the following actions step-by-step until the fault ceases:

8. Check that the Y link cable is correctly connected to both the IXU and the RRU
9. Check that the cable is free from damage
10. If the Y Link cable is damaged, replace it *according to Section 9.5.11 Y Link Cable Replacement on page 223*

Replacing the RRU

11. Replace the RRU, *see Section 9.5.8 RRU Replacement on page 215*

Replacing the IXU

12. Replace the IXU, *see Section 9.5.3 IXU Replacement on page 199*

9.3.4 SO CF RU:4/ TIM

This section describes how to localise an SO CF RU:4/ TIM fault.

Related RUs

The RUs listed below have higher priority than the RU described in this section. If they are present, go to the related section before handling this RU.

- If ''SO CF RU:0/ IXU'' appears in the OMT, *proceed with Section 9.3.2 SO CF RU:0/ IXU on page 165*
- If ''SO CF RU:3/ Y link'' appears in the OMT, *proceed with Section 9.3.3 SO CF RU:3/ Y Link on page 165*
- If ''SO CF RU:34/ IDB'' appears in the OMT, *proceed with Section 9.3.8 SO CF RU:34/ IDB on page 173*
- If ''SO TRXC RU:0/ RRU'' appears in the OMT, *proceed with Section 9.3.12 SO TRXC RU:0/ RRU on page 178*

Displaying Fault Information

Display fault information according to *Section 9.3.1 Reading Fault Status on page 163*.

Perform the following actions step-by-step until the fault ceases:

Checking Contacts on TIM and IXU

1. Check that the TIM is correctly installed, and that all connector pins on both IXU and TIM are free from damage.

Replacing TIM

2. Replace the TIM, see *Section 9.5.7 TIM Replacement on page 212*.

Resetting IXU

3. Press the **IXU reset** button on the IXU interface panel.

Replacing IXU

4. Replace the IXU, see *Section 9.5.3 IXU Replacement on page 199*.

9.3.5 SO CF RU:14/ Battery

This section describes how to localise an SO CF RU:14/ Battery fault.

Related RUs

- If ''SO CF RU:31/ Environment'' appears in the OMT, together with ''SO CF EC2:10/ Mains fail (external power source fail)'', then proceed with *Section 9.3.7 SO CF RU:31/ Environment on page 171*.

Displaying Fault Information

Display fault information according to *Section 9.3.1 Reading Fault Status on page 163*.

Perform the following actions step-by-step until the fault ceases:

Checking HW/IDB

1. Check the DC power indicator on the IXU, and the RRU interfaces, to locate the cabinet issuing the alarm.
2. Check in the OMT that the IDB configuration is correct, according to the HW cabinet configuration, regarding defined climate system.

Checking Cabinet Power

3. Open the RBS and check that the DC power is switched on.
4. Open the MBU cover and check that the incoming DC cable is correctly connected.

Checking the Battery Backup System

5. Check the backup power chain from the IXU to the battery backup system, including any optional fuses.
6. Check the battery backup system according to the manufacturer's documentation.

9.3.6 SO CF RU:15/ Fan

This section describes how to localise an SO CF RU:15/ Fan fault.

Related RU

The RU listed below has higher priority than the RU described in this section. If it is present, go to the related section before handling this RU.

- If ''SO CF RU:34/ IDB'' appears in the OMT, then proceed with *Section 9.3.8 SO CF RU:34/ IDB on page 173*

Displaying Fault Information

Display fault information according to *Section 9.3.1 Reading Fault Status on page 163*.

Perform the following actions step-by-step until the fault ceases.

Checking IDB Configuration

1. Check in the OMT that the IDB configuration is correct, according to the HW cabinet configuration, regarding defined climate system.

Checking Fan Unit

Caution!

Rotating fan blades can cause injury to body parts that come into contact with the blades. Blades in fan units continue to rotate for a period of time, even after the fan has been switched off. Wait until fans have stopped rotating completely before starting work on or near fans.

2. Remove the fan unit cover.
3. Ensure that the fans rotate freely and without obstruction.

Resetting Fan Unit

4. Press the **Test** button on the fan unit.

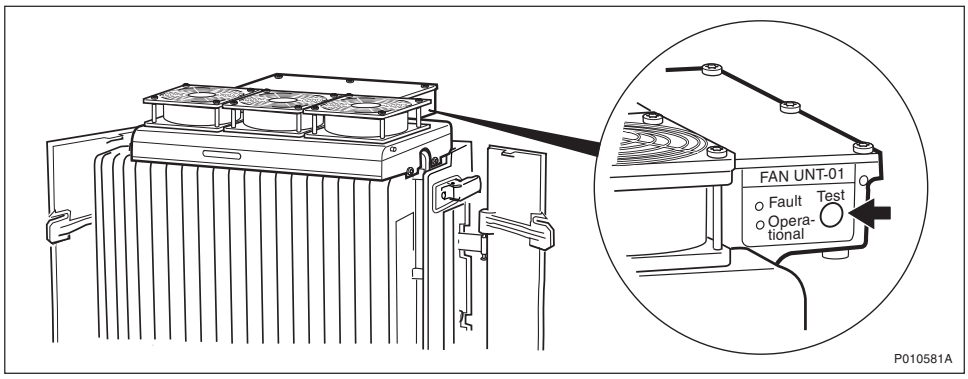


Figure 76 Fan Unit Test Button

5. Check that the test sequence below is carried out:

- The fans run at maximum speed for approximately 5 seconds
- The fans run at nominal speed for approximately 5 seconds
- The fans stop for approximately 5 seconds

6. Ensure that the indicator status of the fan unit is in accordance with the table below:

Table 51 Fan Unit Indicators After Test

Fan Unit Indicator LEDs	Status
Fault	Off
Operational	On

Replacing Fan Unit

7. Replace the fan unit, see *Section 9.5.4 Fan Unit Replacement on page 203*.

9.3.7 SO CF RU:31/ Environment

This section describes how to localise an SO CF RU:31/ Environment fault. This fault is only generated by external factors, for example climate or incoming power.

Related RU

The RU listed below has higher priority than the RU described in this section. If it is present, go to the related section before handling this RU.

- If ''SO CF RU:34/ IDB'' appears in the OMT, then proceed with *Section 9.3.8 SO CF RU:34/ IDB on page 173*

Displaying Fault Information

Display fault information according to *Section 9.3.1 Reading Fault Status on page 163*.

Perform the following actions step-by-step until the fault ceases:

Checking IDB Configuration

1. Check in the OMT that the IDB configuration is correct, according to the HW cabinet configuration, regarding defined power system and climate system.

Checking Climate

2. Inspect the airflow path in the RBS, and ensure that the airflow is not obstructed.

3. If the temperature is between 45 and 55° C, install a fan unit. For more information, see *Chapter Installation of RBS* in this manual. If the temperature is below -15° C, then the RBS should be powered with AC. AC power is needed for the RBS to start the heater. For more information, see:

	RBS 2308, RBS 2309,RBS 2109 and EBB-06 Hardware Reference Manual	*EN/LZT 720 0058*

Checking Incoming AC Power (Optional)

4. Open the MBU cover and use a multimeter to check that the power input is either 100 V AC to 127 V AC, or 200 V AC to 250 V AC.

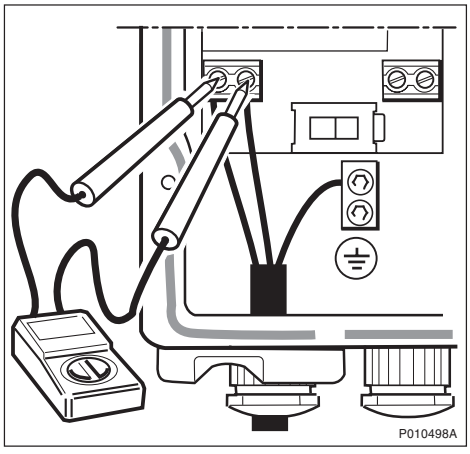


Figure 77 Measuring Incoming AC Voltage

Checking Incoming DC Power (Optional)

5. Open the MBU cover and use a multimeter to check that the voltage, supplying the RBS, is between – 40.5 and – 57 V DC. If DC supply is not detected, then check the DC supply source.

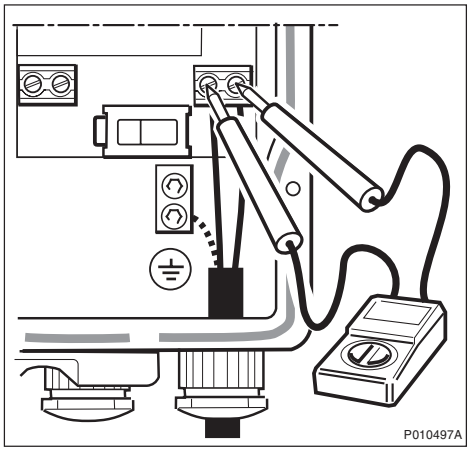


Figure 78 Measuring Incoming DC Voltage

9.3.8 SO CF RU:34/ IDB

This section describes how to localise an SO CF RU:34/ IDB.

Displaying Fault Information

Display fault information according to *Section 9.3.1 Reading Fault Status on page 163*.

Perform the following actions step-by-step until the fault ceases:

Resetting IXU

1. Press the **IXU Reset** button on the IXU Interface panel.

Reinstalling IDB

2. Reinstall the IDB. For more information, *see Chapter Site Installation Tests* in this manual.

Replacing Flash Card

3. Replace the flash card, *see Section 9.5.1 Flash Card Replacement on page 191*.

9.3.9 SO CF RU:40/ Antenna

This section describes how to localise an SO CF RU:40/ Antenna fault.

Related RU

The RU listed below has higher priority than the RU described in this section. If it is present, then go to the related section before handling this RU.

- If ''SO CF RU:34/ IDB'' appears in the OMT, then proceed with *Section 9.3.8 SO CF RU:34/ IDB on page 173*

Displaying Fault Information

Display fault information according to *Section 9.3.1 Reading Fault Status on page 163*.

Perform the following actions step-by-step until the fault ceases:

Reading ARAE Alarm Status

Note: This step is only valid if ''SO CF EC2:13/ Auxiliary equipment fault'' appears in the OMT.

1. In the **Configuration** menu, select **Read IDB** and click **Yes**.
2. In the **Maintenance** menu, select **Monitor**.
3. Select **Alarm Inlets** and click **Run**.
4. Check that the ARAE fault is correctly defined in the IDB.
5. Check the cable to the equipment supervised by the ARAE alarm.
6. Replace the faulty equipment supervised by that alarm.

Checking RX Diversity

7. Ensure that the cell is configured, in the BSC, with the correct diversity (RXD).
8. Confirm that radio cables are connected to the correct RRUs and antennas.

Performing DTF Test

9. Disconnect the faulty feeder and locate the fault, by performing a Distance To Fault (DTF) test. For more information, see chapter *Antenna System Tests* in this manual.
10. Replace the faulty equipment identified in the DTF test.

    Note: The RXBP and MCB are not included in the DTF test.

11. If no faulty equipment was identified, replace the antenna.

9.3.10 SO CF RU:48/ GPS Receiver

This section describes how to localise an SO CF RU:48/ GPS Receiver. To avoid complete loss of traffic, have the BSC operator configuring PCM as backup synchronisation source (SYNCSRC=DEFAULT).

Related RUs

The RUs listed below have higher priority than the RU described in this section. If they are present, go to the related section before handling this RU.

- If ''SO CF RU:34/ IDB'' appears in the OMT, then proceed with *Section 9.3.8 SO CF RU:34/ IDB on page 173*
- If ''SO CF RU:0/ IXU'' appears in the OMT, then proceed with *Section 9.3.2 SO CF RU:0/ IXU on page 165*

Displaying Fault Information

Display fault information according to *Section 9.3.1 Reading Fault Status on page 163*.

Perform the following actions step-by-step until the fault ceases:

Replacing GPS Receiver

1. Disconnect the power to the GPS, for example by disconnecting the connector in the OVP. Wait a few minutes and then reconnect the power.
2. Replace the GPS receiver.

9.3.11 SO CF RU:49/ GPS Receiver DXU Cable

This section describes how to localise an SO CF RU:49/ GPS Receiver DXU cable. To avoid complete loss of traffic, ensure that the BSC operator configures PCM as backup synchronisation source (SYNCSRC=DEFAULT).

Related RUs

The RUs listed below have higher priority than the RU described in this section. If they are present, go to the related section before handling this RU.

- If ''SO CF RU:34/ IDB'' appears in the OMT, then proceed with *Section 9.3.8 SO CF RU:34/ IDB on page 173*
- If ''SO CF RU:0/ IXU'' appears in the OMT, then proceed with *Section 9.3.2 SO CF RU:0/ IXU on page 165*

Displaying Fault Information

Display fault information according to *Section 9.3.1 Reading Fault Status on page 163*.

Perform the following actions step-by-step until the fault ceases:

Precondition

Before starting this procedure, ensure that the GPS system has no fault and is properly installed.

Check IXU GPS Cable

1. Check that the IXU GPS cable is free from damage. Replace if needed.
2. Check that the IXU GPS cable is correctly connected to the GPS/AUX port on the IXU.
3. If an EBB-01 is used, then check that the GPS and GPS/AUX cables on the EBB-01 are correctly connected.

Localising Fault on GPS Receiver

4. Check all cables and equipment (including the GPS receiver) connected to the signal chain between the IXU GPS cable and the GPS receiver.
5. Check the power supply to the GPS by checking the DC LED in the OVP.

Refer to manufacturer's documentation to perform fault localisation on the GPS receiver.

Checking DC Supply

6. Check that both the – 48 V LINK cable and the termination block are correctly connected, as shown in the figures below.

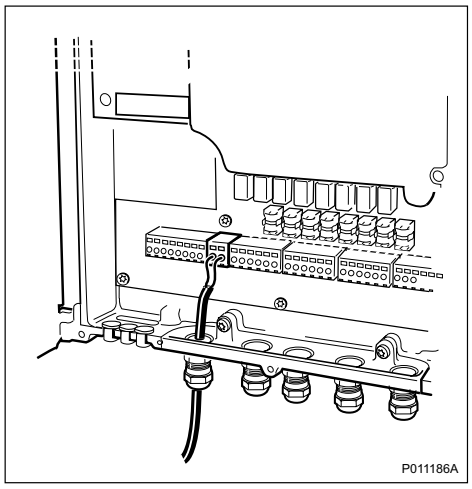


Figure 79 Cable Connection Check

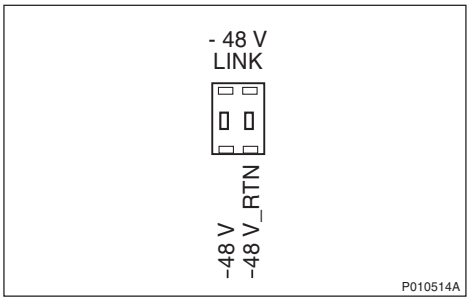


Figure 80 Connector Connection Check

7. Perform a cold reset on the GPS by disconnecting the termination block for a few seconds.

8. Check that both the – 48 V LINK cable and the conductor are free from damage. Replace if needed.

9. Check that the voltage is – 48 V DC, using a multimeter.

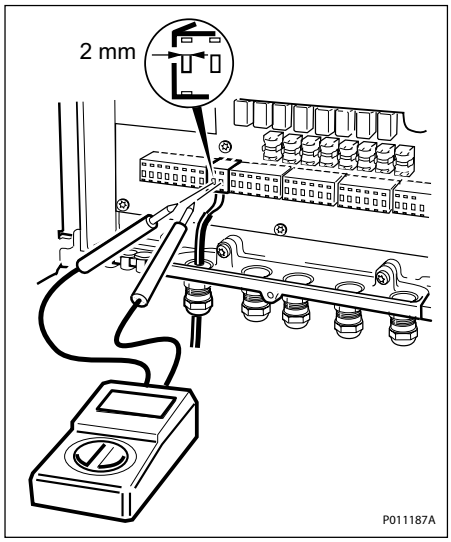


Figure 81 Voltage Check

9.3.12 SO TRXC RU:0/ RRU

This section describes how to localise an SO TRXC RU:0/ RRU fault.

Related RUs

The RUs listed below have higher priority than the RU described in this section. If they are present, go to the related section before handling this RU.

- If "SO CF RU:3/ Y link" appears in the OMT, then proceed with *Section 9.3.3 SO CF RU:3/ Y Link on page 165*
- If "SO CF RU:31/ Environment" appears in the OMT, then proceed with *Section 9.3.7 SO CF RU:31/ Environment on page 171*
- If "SO CF RU:34/ IDB" appears in the OMT, then proceed with *Section 9.3.8 SO CF RU:34/ IDB on page 173*

Two TXs are used when TX diversity is activated, but only the first TX sends the alarm. The fault is therefore located in a different RRU.

Displaying Fault Information

Display fault information according to *Section 9.3.1 Reading Fault Status on page 163*.

Perform the following actions step-by-step until the fault ceases:

Resetting RRU

1. Press the **RRU reset** button on the RRU interface panel.

Restarting RRU

2. Switch off the RRU, wait for one minute and switch it on again.

Replacing RRU

3. Replace the RRU, see *Section 9.5.8 RRU Replacement on page 215*.

9.4 Troubleshooting Using the RBS Indicators

This section describes troubleshooting procedures using the RBS indicators.

If no faults are detected in the RBS, then the indicators should be in accordance with the tables below.

Table 52 RRU Indicator Status When the RBS is in Operation

RRU Indicator	State
Fault	Off
Operational	On
Local	Off
RF off	Off
AC power on	On(1)
DC power on	On(1)
RRU temp.	Off

(1) Depending on power system configuration.

Table 53 IXU Indicator Status When the RBS is in Operation

IXU Indicator	State
Fault	Off
Operational	On
Local	Off
RBS fault	Off
External alarm	Off
AC power on	On(1)
DC power on	On(1)

Table 53 IXU Indicator Status When the RBS is in Operation

IXU temp.	Off
Transmission OK	On(2)

(1) Depending on power system configuration.
(2) A, B, C and/or D, depending on transmission configuration.

If the indicators indicate a fault, *see the applicable Section below*.

9.4.1 Corrective Actions for the IXU

Fault

If the fault indicator is ON (red), IXU HW fault(s) are detected. Perform the following actions step-by-step until the fault ceases:

- Use the OMT to display fault information, see *Section 9.3 Fault Localisation Using OMT on page 162.* If the OMT cannot be connected, then proceed with the steps below
- Ensure that the flash card has been properly inserted in the IXU
- Replace the IDB and SW on the flash card, see *Section 9.5.1 Flash Card Replacement on page 191*
- Replace the flash card, see *Section 9.5.1 Flash Card Replacement on page 191*
- Replace the IXU, see *Section 9.5.3 IXU Replacement on page 199*

Operational

If the Operational indicator is flashing (green) then configuration activity, initiated from the BSC, is in progress. Example: SW download or synchronisation is in progress. A SW download from the BSC can take 30 – 60 minutes, and synchronization 5 – 10 minutes.

- Wait until activity is finished, that is until the flashing stops

Local

If the Local indicator is ON (yellow) and it is not possible to bring the IXU into remote mode, either by using the OMT or by pressing the IXU Local/Remote button, then perform the following actions step-by-step until the fault ceases:

- Reset the IXU
- Install a new IDB using a OMT, see chapter Site Installation Tests
- Replace the IXU. See *Section 9.5.3 IXU Replacement on page 199*

If the Local indicator is flashing (yellow) and the anticipated BSC communication cannot be established, then perform the following actions step-by-step (in close cooperation with the BSC operator) until the fault ceases:

- Reset the IXU
- Ensure that the expected Transmission OK LEDs are ON

  Note: Transmission OK LEDs only indicate that the incoming transmission signal is present electrically. The physical transmission connection should still be checked.

- Ensure that the TEI value in the RBS IDB corresponds with the CF TEI value set in the BSC for this RBS. Request that the BSC operator checks that no other RBSs are using the same CF TEI value on the transmission line
- Ensure that the following transmission parameters in the RBS IDB are correct:
  - Transmission Interface (E1 or T1)
  - CRC-4
  - Spare Bits
  - Sync Source
  - Receiver Sensitivity
  - LBO
- Ensure that all RBSs, connected on the same transmission line between the BSC and this RBS, have Cascade defined as Network Topology in the IDB
- Ensure that the BSC has a correctly configured A-bis path to the RBS
- Ensure that the corresponding TRH and RBLT devices in the BSC are working

RBS Fault

If the RBS fault indicator is ON(yellow), an RBS fault(s) is detected. Perform the following actions step-by-step until the fault ceases:

- Use the OMT to display fault information, *see Section 9.3 Fault Localisation Using OMT on page 162*

External Alarm

If the External alarm indicator is on (yellow), external alarm(s) is active in the RBS. Perform the following actions step-by-step until the fault ceases:

- Use the OMT to display fault information. *See the following instructions:*

1. Start the OMT.
2. In the **Maintenance** menu, select **Monitor**.
3. Select **External Alarms Status** and click **Start Monitor**.
4. In the Available monitors box, select "MO fault maps" and click → to add "RBS" in the Monitors to start box.
5. Check the Display Status window to see which external alarms are active.
6. Check that the external alarm are correcly defined in the IDB
7. When the faults are corrected, close the Display Status window.

AC Power On

If the AC power on indicator is OFF (green), and if AC Mains power should be available, then perform the following actions step-by-step until the fault ceases or until the IXU power is confirmed:

For more information about RBS AC mains voltage, *see:*

RBS 2308, RBS 2309, RBS 2109 and EBB-06 Hardware Reference Manual	*EN/LZT 720 0058*

- Ensure that the RBS AC Mains power switch on the MBU is ON
- Open the MBU cover and use a multimeter to check that the power input is either 100 V AC to 127 V AC, or 200 V AC to 250 V AC.

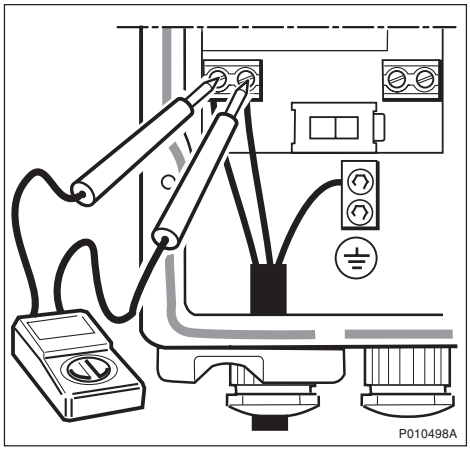


Figure 82 Measuring Incoming AC Voltage

- Disconnect the power cable from the IXU and use a multimeter to check that the power supply to the IXU, is either 100 V AC to 127 V AC, or 200 V AC to 250 V AC, *see table below*

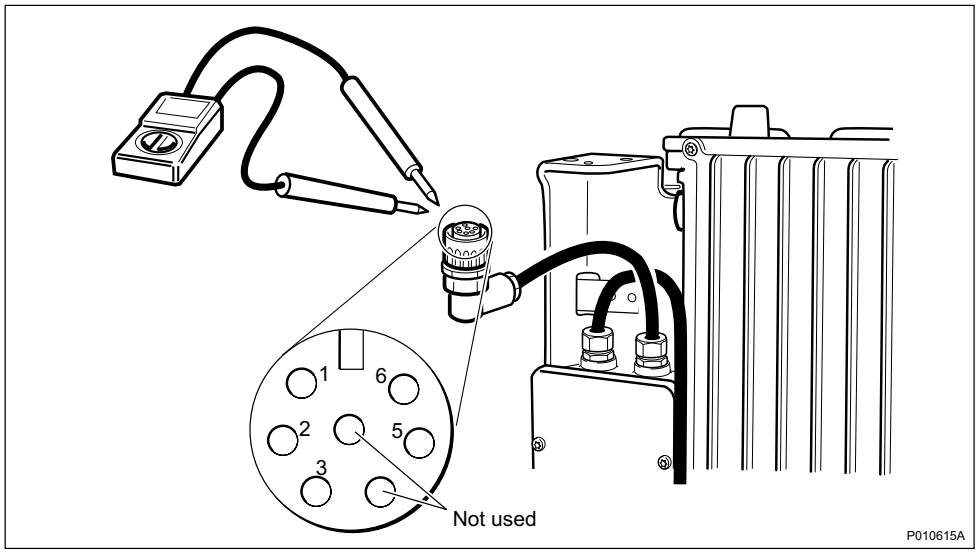


Figure 83 Measuring AC Voltage on IXU Power Cable

Table 54 Pins and Functions

Connector Pin	Function
1	DC_P
2	DC_N
3	PE
5	AC_L2
6	AC_L1

- Replace the PIB in the MBU, see *Section 9.5.6 PIB Replacement on page 209*
- Replace the IXU, see *Section 9.5.3 IXU Replacement on page 199*

DC Power On

If the DC power on indicator is OFF (green), and if DC supply should be available, then perform the following actions step-by-step until the fault ceases, or until the IXU power is confirmed:

For more information about RBS DC supply voltage, *see:*

	RBS 2308, RBS 2309, RBS 2109 and EBB-06 Hardware Reference Manual	*EN/LZT 720 0058*

- Ensure that the RBS DC supply switch on the MBU is ON

- Open the MBU cover and use a multimeter to check that the incoming voltage is between – 40.5 V DC and – 57 V DC

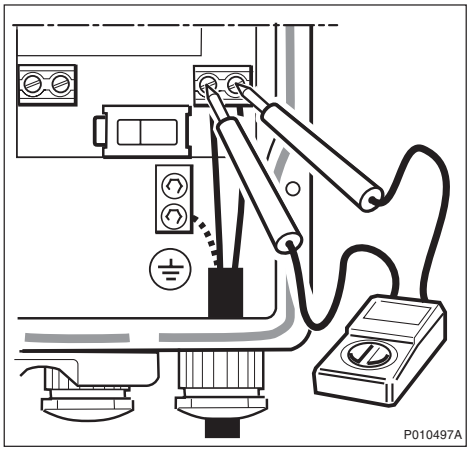


Figure 84 Measuring Incoming DC Voltage

- Disconnect the power cable from the IXU and use a multimeter to check that the voltage, supplying the IXU, is between – 40.5 V DC and – 57 V DC, *see table below*

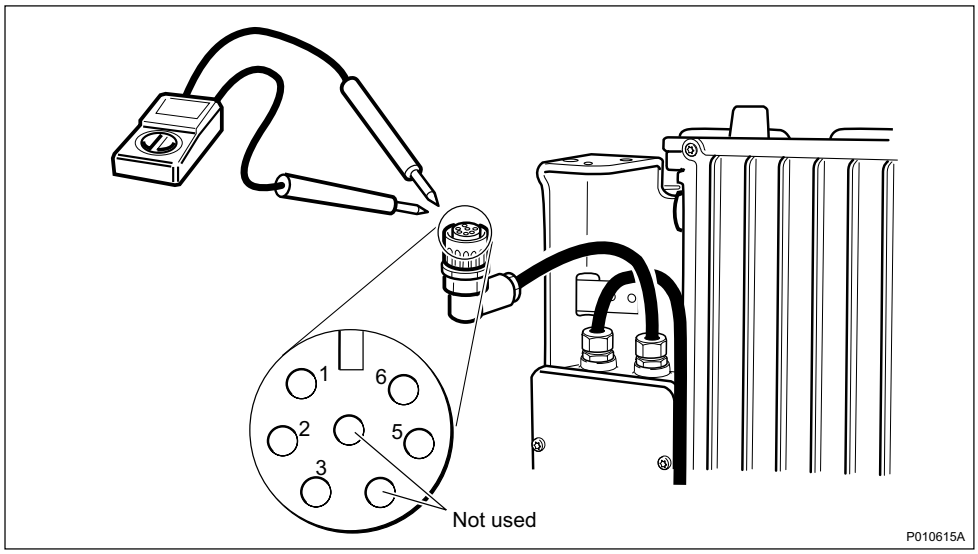


Figure 85 Measuring Voltage on IXU Power Cable

Table 55 Pins and Functions

Connector Pin	Function
1	DC_P
2	DC_N

Table 55 Pins and Functions

Connector Pin	Function
3	PE
5	AC_L2
6	AC_L1

- Replace the PIB in the MBU, see *Section 9.5.6 PIB Replacement on page 209*
- Replace the IXU, see *Section 9.5.3 IXU Replacement on page 199*

IXU Temp

If the IXU temp indicator is ON (yellow) and the conditions are hot, perform the following actions step-by-step until the fault ceases:

- Ensure that airflow is not obstructed above or below the RRU, or through its cooling flanges
- Install the IXU cabinet at a colder location

If the IXU temp indicator is ON (yellow) and the conditions are cold, perform the following actions step-by-step until the fault ceases:

Note: The IXU will not start if it is too cold. It can take up to 75 minutes for the internal heater to warm up the IXU.

- Ensure that the IXU is provided with AC Mains power, since the heater in the IXU only works when AC Mains power supply is available
- Install the IXU cabinet at a warmer location

Transmission OK

If a Transmission OK port LED indicator is OFF (green), even though transmission is expected, then perform the following actions step-by-step until the fault ceases:

- Ensure that the TIM is properly mounted, and the selector switch for transmission impedance selection is set correctly for each port
- Ensure that the transmission cables have been properly connected to the right port in the IXU, and each cable thread connected to the correct inlet

  Note: The order of the ports in the IXU is: A C B D.

- Ensure that the external transmission equipment is working properly and that cables are connected correctly

- Swap the cable thread pairs
- Perform a transmission test, see chapter *RBS Site Integration*
- Check the transmission cable. If it is faulty, replace it
- Replace the TIM, *see Section 9.5.7 TIM Replacement on page 212.*
- Replace the IFB, *see Section 9.5.2 IFB Replacement on page 195.*

9.4.2 Corrective Actions on the RRU

Fault

If the fault indicator is ON (red), an RRU HW fault(s) is detected. Perform the following actions step-by-step until the fault ceases:

- Use the OMT to display fault information, see *Section 9.3.1 Reading Fault Status on page 163*

Operational

If the Operational indicator is flashing (green), then a configuration activity, initiated from the BSC or the IXU, is in progress. For example, SW download or synchronisation is is progress. A SW download from the BSC can take 30 – 60 minutes, a SW download from the IXU flash card 5 – 10 minutes and synchronization 5 – 10 minutes.

- Wait until activity is finished, that is until the flashing stops

Local

If the Local indicator is ON (yellow) and if it is not possible to bring the RRU into remote mode, either by using the OMT or by pressing the RRU Local/Remote, then perform the following actions step-by-step until the fault ceases:

- Reset the RRU
- Replace the RRU, see *Section 9.5.8 RRU Replacement on page 215*

If the Local indicator is flashing (yellow) and BSC communication (though expected) is not established, check the Local indicator on the IXU.

If the Local indicator on the IXU is flashing, see *Page 180.*

If the IXU has established a BSC connection, perform the following actions step-by-step until the fault ceases:

- Ensure that the BSC has deblocked the TRXCs for the RBS

- Ensure that the BSC has a correct configured A-bis path to the RBS [Digital Connection Point (DCP)].
- Reset the RRU
- Ensure that the Y link cable is undamaged and properly connected to the correct ports, both on the RRU and the IXU
- Check that each transmission line is connected to the correct ports in both the RRU and the IXU

  Note: The IXU could be able to establish BSC connection even if the transmission lines have been connected to the ports wrongly. The order of the ports in the IXU is: A C B D.

- Ensure that the RRU is defined in the installed IDB. To create a new IDB, *see Chapter Site Installation Tests* in this manual.
- Reset the IXU
- Replace the Y link cable, see *Section 9.5.11 Y Link Cable Replacement on page 223*
- Replace the RRU, see *Section 9.5.8 RRU Replacement on page 215*
- Replace the IXU, see *Section 9.5.3 IXU Replacement on page 199*

RF Off

RRU is not transmitting on any of its radio ports. No TX in the RRU is enabled at the BSC.

AC Power On

If the AC power on indicator is OFF (green), and if AC Mains power should be available, perform the following actions step-by-step until the fault ceases:

For more information about RBS AC mains voltage, *see:*

RBS 2308, RBS 2309, RBS 2109 and EBB-06 Hardware Reference Manual *EN/LZT 720 0058*

- Ensure that the RBS AC supply and RRU power switches on the MBU are ON
- Open the MBU cover and use a multimeter to check that the power input is either 100 V AC to 127 V AC, or 200 V AC to 250 V AC

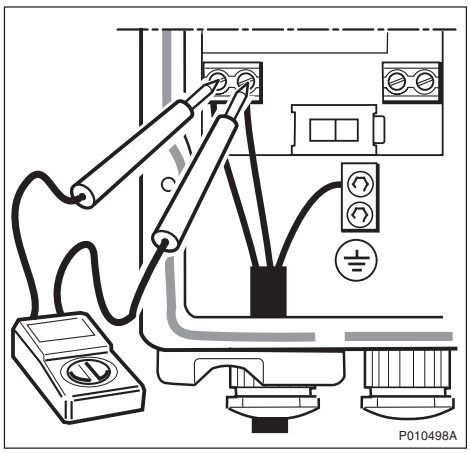


Figure 86 Measuring Incoming AC Voltage

- Disconnect the power cable from the RRU and use a multimeter to check that the power supply to the RRU, is either 100 V AC to 127 V AC, or 200 V AC to 250 V AC, *see table below*.

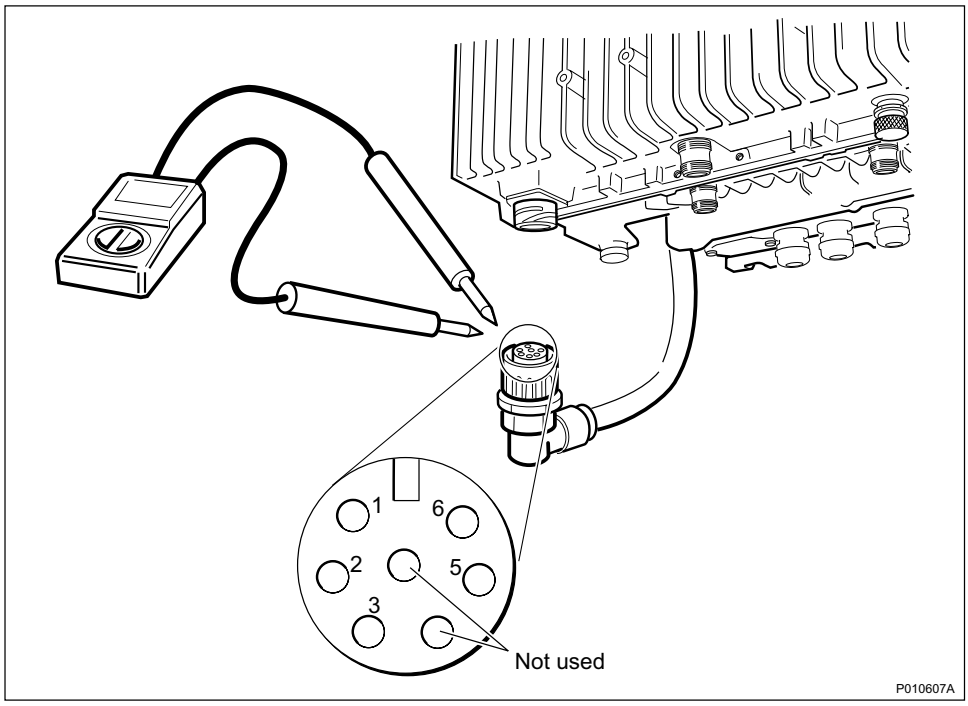


Figure 87 Measuring Voltage on the RRU Power Cable

Table 56 Pins and Functions

Connector Pin	Function
1	DC_P
2	DC_N
3	PE
5	AC_L2
6	AC_L1

- Replace the PIB in the MBU, see *Section 9.5.6 PIB Replacement on page 209*
- Replace the RRU, see *Section 9.5.8 RRU Replacement on page 215*

DC Power On

If the DC power on indicator is OFF (green) and if DC supply should be available, perform the following actions step-by-step until the fault ceases:

For more information about RBS DC supply voltage, *see:*

RBS 2308, RBS 2309, RBS 2109 and EBB-06 Hardware Reference Manual *EN/LZT 720 0058*

- Ensure that the RBS DC supply and RRU switches on the MBU are ON
- Open the MBU cover and use a multimeter to check that the incoming voltage is between – 40.5 V DC and – 57 V DC

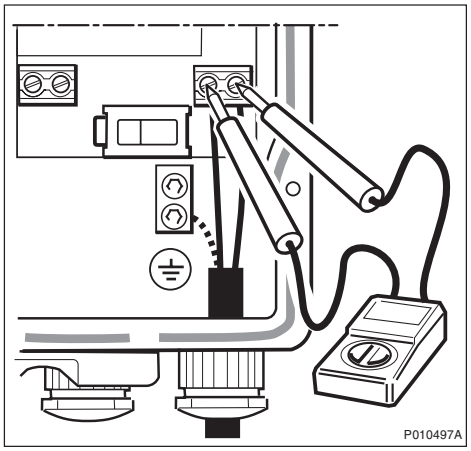


Figure 88 Measuring the Incoming DC Voltage

- Disconnect the power cable from the RRU and use a multimeter to check that the voltage, supplying the RRU, is between – 40.5 and – 57 V DC. *See figure and table below.*

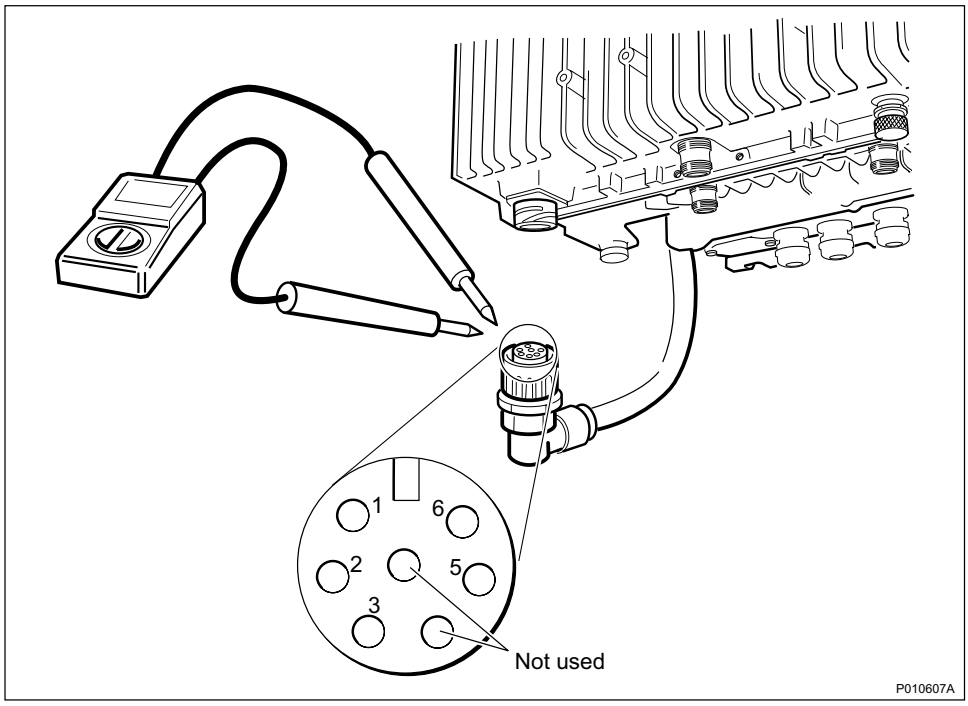


Figure 89 Measuring the Voltage on RRU Power Cable

Table 57 Pins and Functions

Connector Pin	Function
1	DC_P
2	DC_N
3	PE
5	AC_L2
6	AC_L1

- Replace the PIB in the MBU, see *Section 9.5.6 PIB Replacement on page 209*

- Replace the RRU, see *Section 9.5.8 RRU Replacement on page 215*

RRU Temp

If the RRU temp indicator is ON (yellow), and the conditions are hot, perform the following actions step-by-step until the fault ceases:

- Ensure that airflow is not obstructed above or below the RRU, or through its cooling flanges
- Install a fan unit to the RRU
- Install the RRU cabinet at a colder location

If the RRU temp indicator is ON (yellow) and the conditions are cold, perform the following actions step-by-step until the fault ceases:

Note: The RRU will not start if it is too cold. It can take up to 75 minutes for the internal heater to warm up the RRU.

- Ensure that the RRU is provided with AC Mains power, since the heater in the RRU only works when AC Mains power is available
- Install the RRU cabinet at a warmer location

9.5 HW Replacement

This section describes how to replace faulty units identified in *Section Fault Localisation*.

9.5.1 Flash Card Replacement

This section describes how to replace a faulty flash card.

Loading IDB and SW (Optional)

This section describes how to load the IDB and SW onto the new flash card.

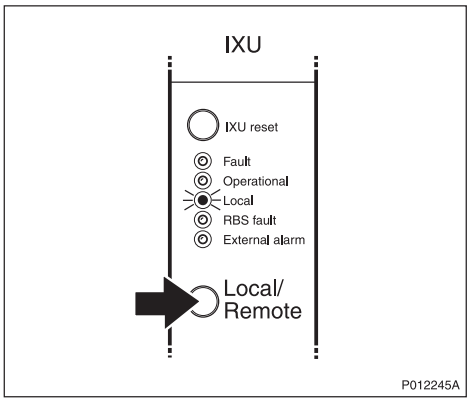
1. Create and save an IDB. For more information, see chapter *Site Installation Tests* in this manual.
2. From the **Configuration** menu in the OMT, select **Load flash card**.
3. In **Flash card location**, click **Browse** and select the location of the flash card driver.
4. In **Select IDB to use on flash card**, click **Browse** and select the IDB to use.
5. In **Select RBS SW to use on flash card**, click **Browse** and select the SW to use.
6. Click **Load**.

Taking the RBS Out of Operation

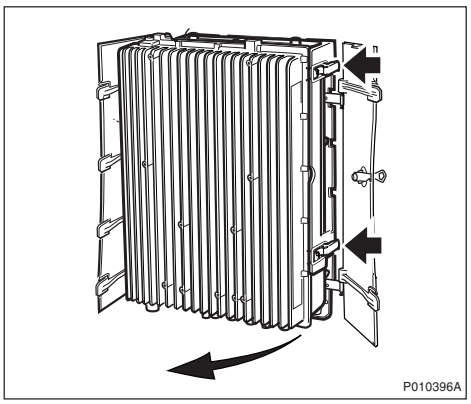
1 Open the sunshields.

2 Contact the OMC operator to obtain permission to temporarily take cells out of service. Wait until the RF off indicator (on all RRU interface panels) shows a continous light.

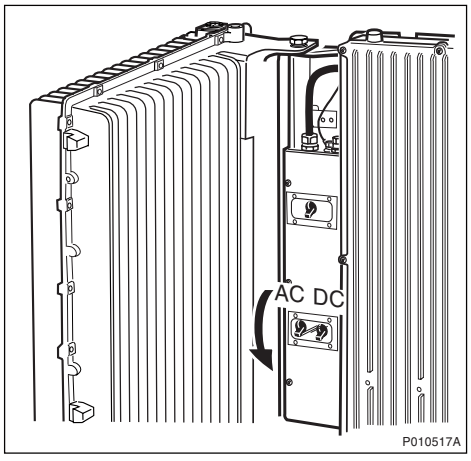
3 Press the Local/Remote button on the IXU to set the RBS to local mode. Wait until the local indicator on the IXU shows a continous light.



4 Open the two clasps and pull the RRU to the left side, to gain access to the power switches.

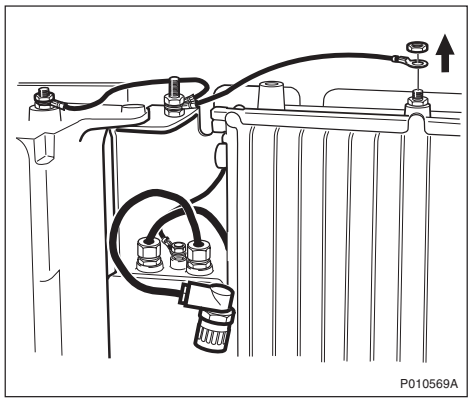


5 Switch off the AC Mains power and DC power supply.



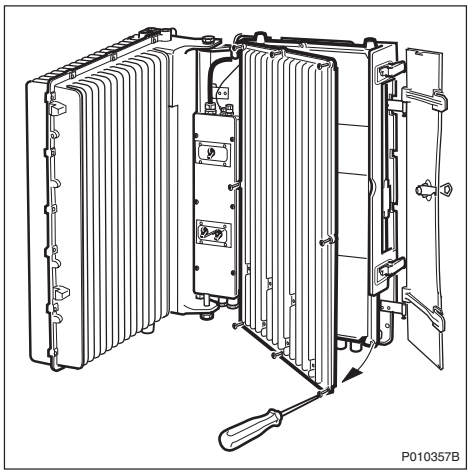
Replacing Flash Card

6 Disconnect the AC/DC cable and the earth cable from the IXU.

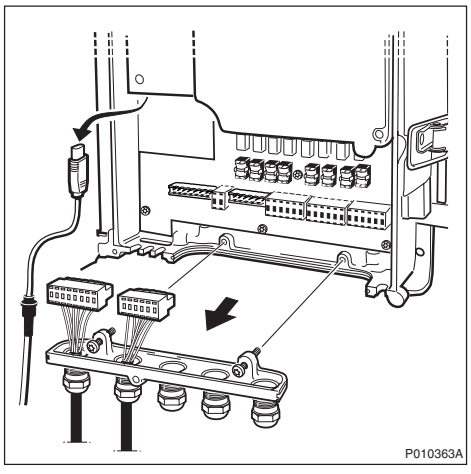


7 Disconnect the OMT cable.

8 Open the IXU cover.

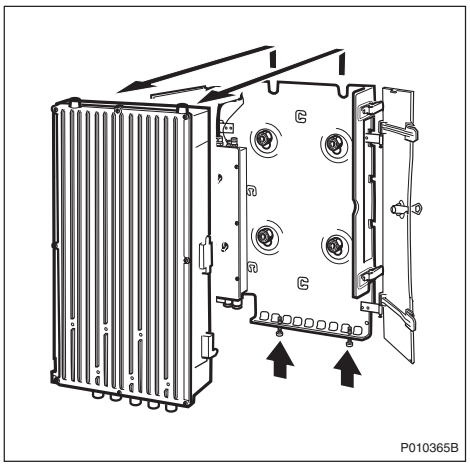


9 Remove the connection frame and loosen the cables from the IFB. Remove the Y link cable(s).

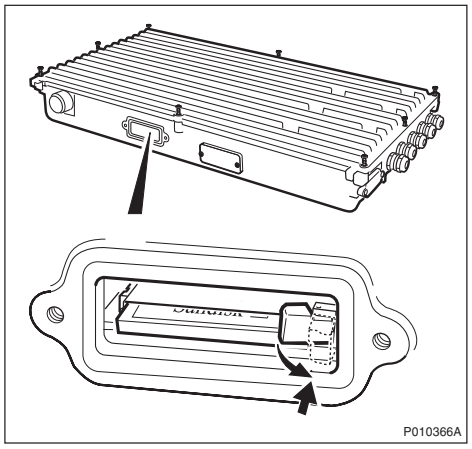


Note: Make a note of which connectors the Y link cables were connected to.

10 Loosen the two securing screws under the IXU and remove the unit.



11 Remove the cover for the flash card. To remove the flash card, lift up the release lever and then push it in.



12 Insert the new flash card, reset the lever, then refit the cover.

Note: The flash card should be preloaded with the correct software and IDB. For instructions, *see Chapter Site Installation Tests*.

13 Mount the IXU and secure it with the two screws under the IXU.

14 Connect the Y link cable(s). Ensure the Y link cable(s) are connected to the correct connector(s).

15 Mount the connection frame and connect all cables. Close the IXU cover.

16 Connect the earth cable and the AC/DC cable.

Taking the RBS Into Operation

17 Switch on the appropriate power supply: AC Mains, DC, or both AC and DC.

18 If new SW has earlier been prepared for loading, it now starts. This may take up to 10 minutes.

19 Close the RRU.

20 Inform the OMC operator that the applicable cells are to be taken into service.

21 Press the Local/Remote button on the IXU, and the RRUs to set the RBS to remote mode. Wait until the RF off indicator on the RRU interface panel extinguishes and the Operational indicator illuminates.

22 Close the sunshields.

Handling Replaced Units

Unless under contractual warranty, after replacement, the flash card should be disposed of locally by the customer according to environmental regulations. Do not return the flash card to Ericsson for replacement, repair or disposal.

9.5.2 IFB Replacement

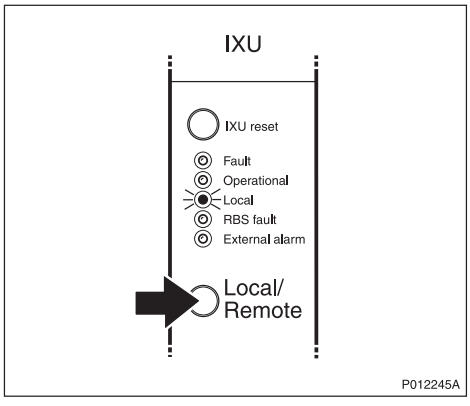
This section describes how to replace a faulty IFB.

Taking the RBS Out of Operation

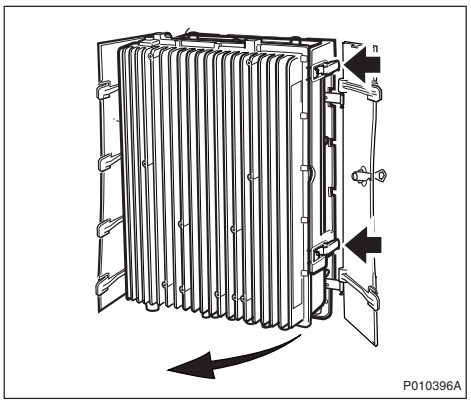
1 Open the sunshields.

2 Contact the OMC operator to obtain permission to temporarily take cells out of service. Wait until the RF off indicator (on all RRU interface panels) shows a continous light.

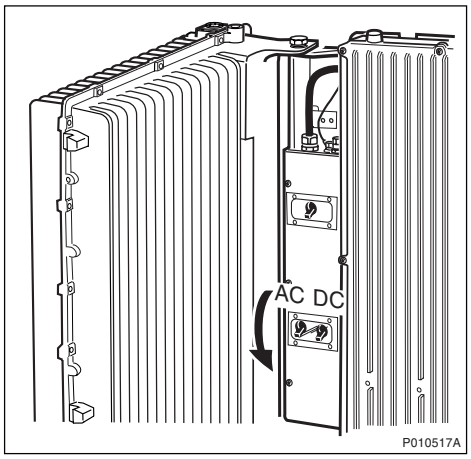
3 Press the Local/Remote button on the IXU to set the RBS to local mode. Wait until the local indicator on the IXU shows a continous light.



4 Open the two clasps and pull the RRU to the left side, to gain access to the power switches.

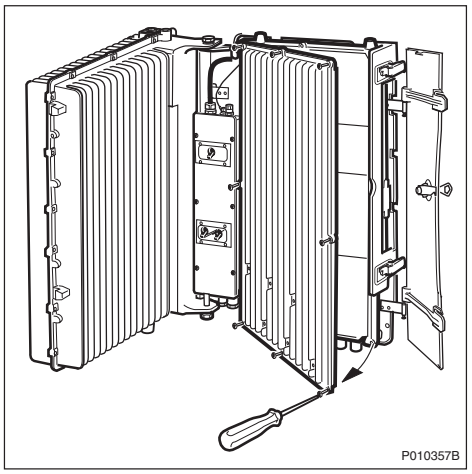


5 Switch off AC Mains power and DC power supply.

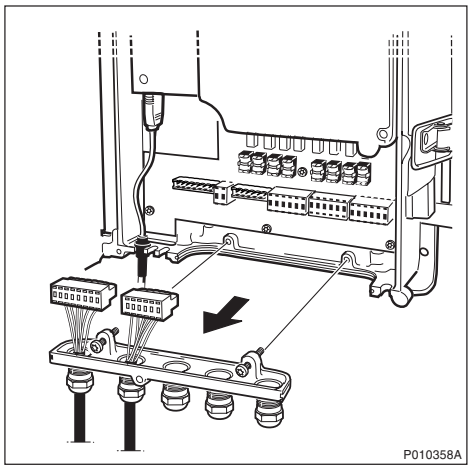


Replacing IFB

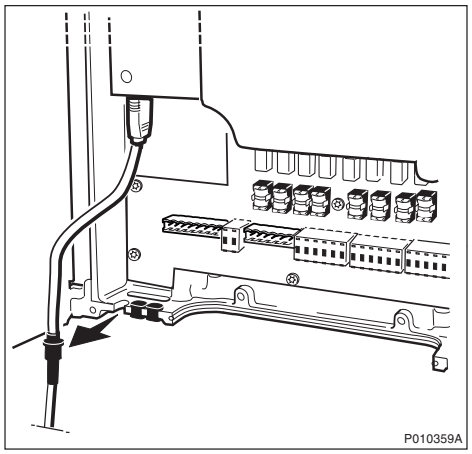
6 Open the IXU cover.



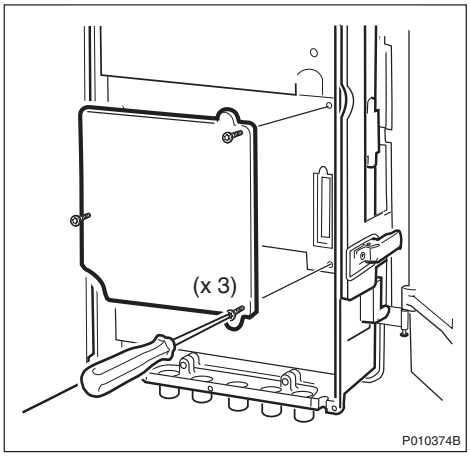
7 Remove the connection frame and all cables from the IFB.



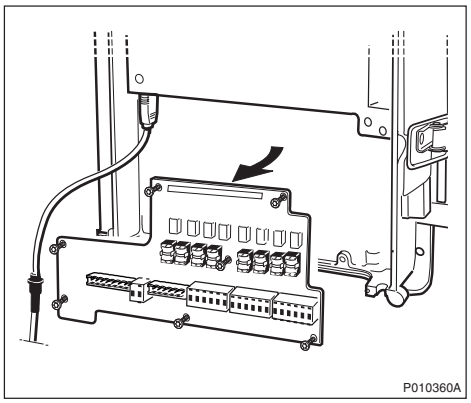
8 Loosen, but do not remove, the Y link cable(s) from the cable inlet.



9 Remove the TIM after loosening the three screws.



10 Remove the IFB after loosening the seven screws.



11 Put back the new IFB, the connection frame, and all cables.

12 Put back the TIM. Tighten the screws to 1.7 Nm.

13 Secure the Y link cable(s).

14 Reconnect the IXU cover.

Taking the RBS Into Operation

15 Switch on the appropriate power supply: AC Mains, DC, or both AC and DC.

16 Close the RRU.

17 Inform the OMC operator that the applicable cells are to be taken into service.

18 Press the Local/Remote button on the IXU to set the RBS to remote mode. Wait until the RF off indicator on the RRU interface panel extinguishes and the Operational indicator illuminates.

19 Close the sunshields.

Handling Replaced Units

Unless under contractual warranty, after replacement, the IFB should be disposed of locally by the customer according to environmental regulations. Do not return the IFB to Ericsson for replacement, repair or disposal.

9.5.3 IXU Replacement

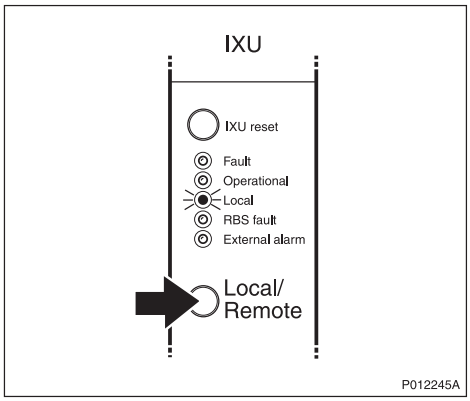
This section describes how to replace a faulty IXU.

Taking the RBS Out of Operation

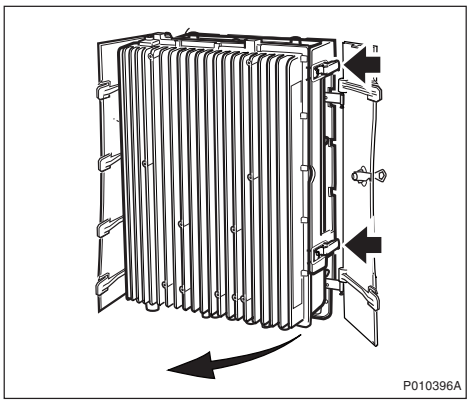
1 Open the sunshields.

2 Contact the OMC operator to obtain permission to temporarily take cells out of service. Wait until the RF off indicator (on all RRU interface panels) shows a continous light.

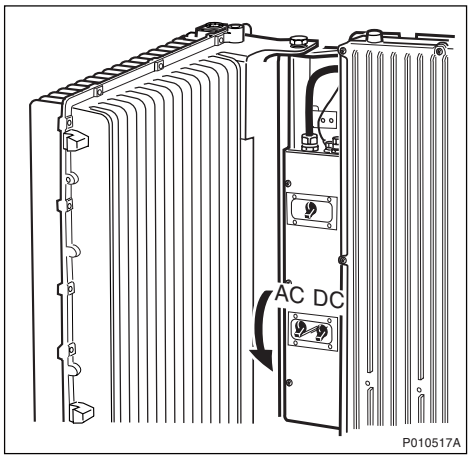
3 Press the Local/Remote button on the IXU to set the RBS to local mode. Wait until the local indicator on the IXU shows a continous light.



4 Open the two clasps and pull the RRU to the left side, to gain access to the power switches.

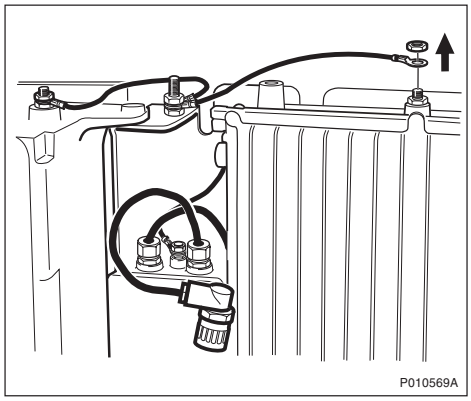


5 Switch off AC Mains power and DC power supply.



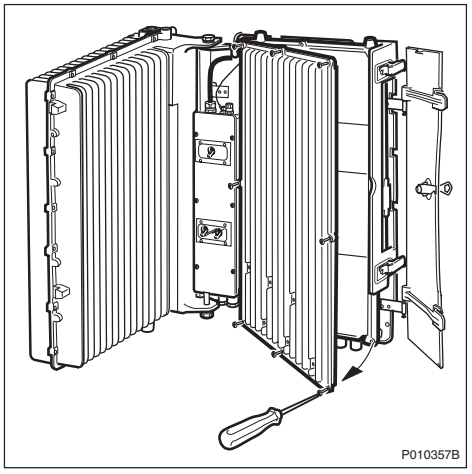
Replacing IXU

6 Disconnect the AC/DC cable and the earth cable.

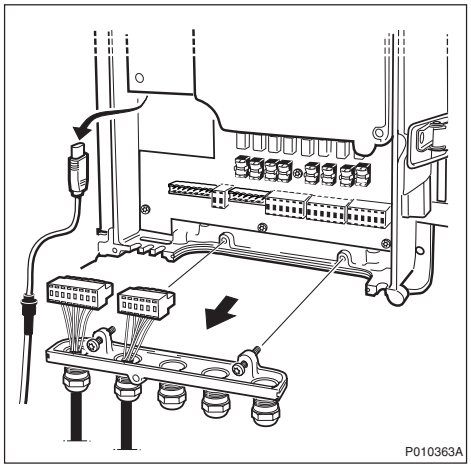


7 Remove the OMT cable.

8 Open the IXU cover.

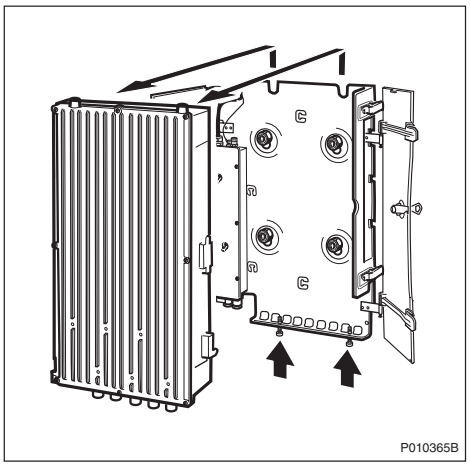


9 Remove the connection frame and loosen the cables from the IFB. Remove the Y link cable(s).

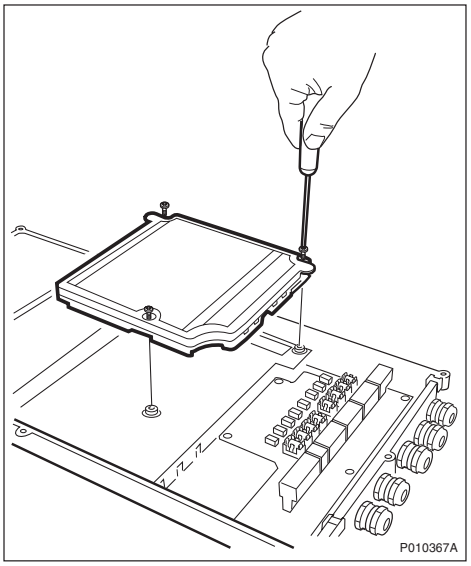


Note: Make a note of which connectors the Y link cables were connected to.

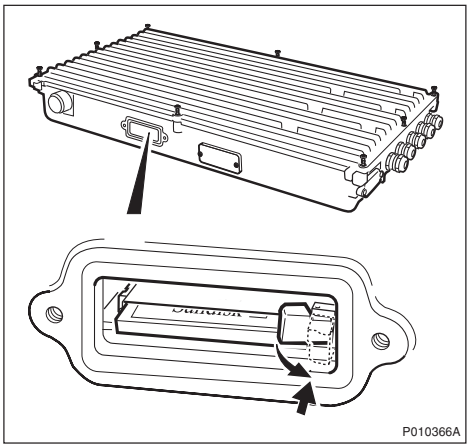
10 Loosen the two securing screws under the IXU, and remove the unit.



11 Remove the TIM from the faulty IXU after loosening the three securing screws.



12 Remove the cover for the flash card. To remove the flash card, lift up the release lever and then push it in.



13 Remove the cover for the flash card. Insert the old flash card in the new unit and push it down and reset the release lever, ensuring that the flash card is in position.

14 Open the cover of the new IXU and insert the TIM. Tighten the screws to 1.7 Nm.

Note: Ensure that the switch positions on the TIM are correct.

15 Mount the connection frame delivered with the new IXU into the old IXU, and close the cover.

16 Mount the IXU and secure it with the two screws under the IXU.

17 Connect the Y link cables. Ensure the Y link cable(s) are connected to the correct connector(s).

18 Mount the connection frame and connect all cables. Close the IXU cover.

19 Connect the earth cable and the AC/DC cable.

Taking the RBS Into Operation

20 Switch on the appropriate power supply: AC Mains, DC or both AC and DC.

21 Close the RRU.

22 Inform the OMC operator that the applicable cells are to be taken into service.

23 Press the Local/Remote button on the IXU to set the RBS to remote mode. Wait until the RF off indicator on the RRU interface panel extinguishes and the Operational indicator illuminates.

24 Close the sunshields.

Handling Replaced Units

The IXU should be returned to Ericsson for repair with a repair delivery note, LZF 084 84 (Blue Tag) attached. Include a clear description of the fault found. *See Section 9.5.12 Performing Concluding Routines on page 226* for instructions on completing a repair delivery note.

9.5.4 Fan Unit Replacement

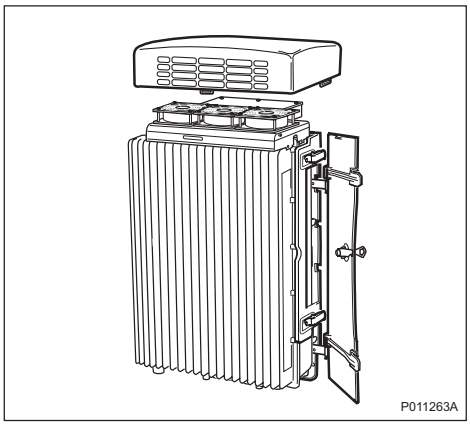
This section describes how to replace a faulty fan unit and how to test the new unit.

Caution!

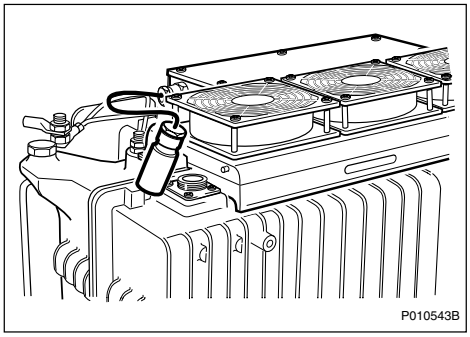
Rotating fan blades can cause injury to body parts that come into contact with the blades. Blades in fan units continue to rotate for a period of time, even after the fan has been switched off. Wait until fans have stopped rotating completely before starting work on or near fans.

Replacing Fan Unit

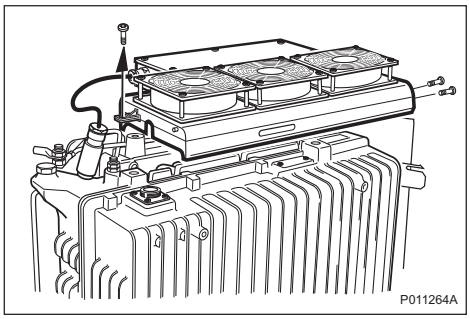
1 Remove the fan unit cover



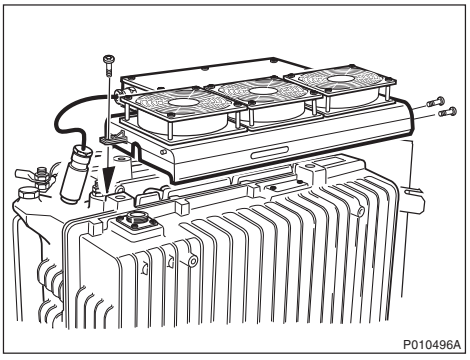
2 Disconnect the fan power cable from the RRU.



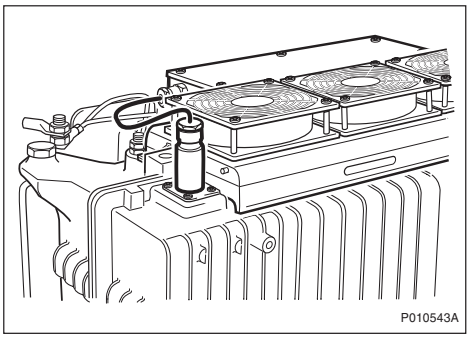
3 Loosen the three screws and remove the fan unit.



4 Install the new fan unit and fasten the three screws.

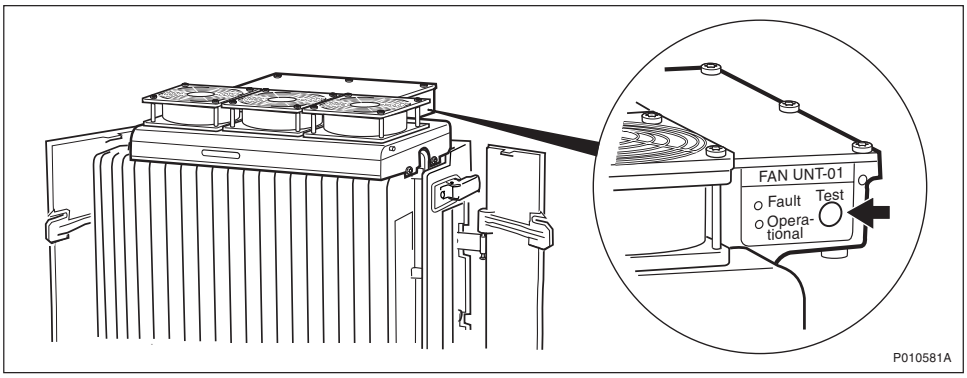


5 Connect the fan power cable to the RRU.



Testing Fan Unit

6 Press the **Test** button on the fan unit.



The fan unit performs a self test

7 Check that the test sequence below is carried out:
- The fans run at maximum speed for approximately 5 seconds
- The fans run at nominal speed for approximately 5 seconds
- The fans stop for approximately 5 seconds

8 Ensure that the indicator status of the fan unit is in accordance with the table below:

Table 58 Fan Unit Indicators After Test

Fan Unit Indicator	Status
Fault	Off
Operational	On

7. Reinstall the fan unit cover.

Handling Replaced Units

Unless under contractual warranty, after replacement, the fan unit should be disposed of locally by the customer according to environmental regulations. Do not return the fan unit to Ericsson for replacement, repair or disposal.

9.5.5 MCB Replacement

This section describes how to replace a faulty MCB.

Caution!

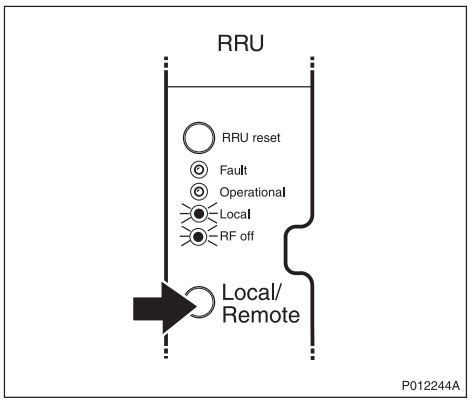
Sharp metal edges may exist that can cause cuts to the skin or clothing. Wear protective gloves when handling this equipment.

Taking the RRU Out of Service

1 Open the sunshields.

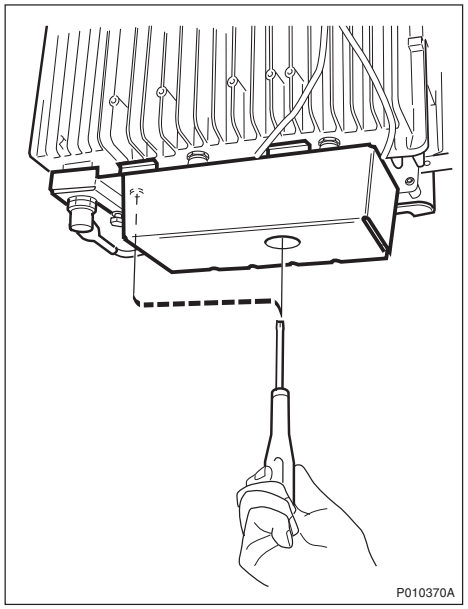
2 Contact the OMC operator to obtain permission to temporarily take the TRXs connected to the RRU out of service. Wait until the RF off indicator shows a continous light.

3 Press the Local/Remote button on the RRU to set the unit to local mode. Wait until the local indicator on the RRU shows a continous light.



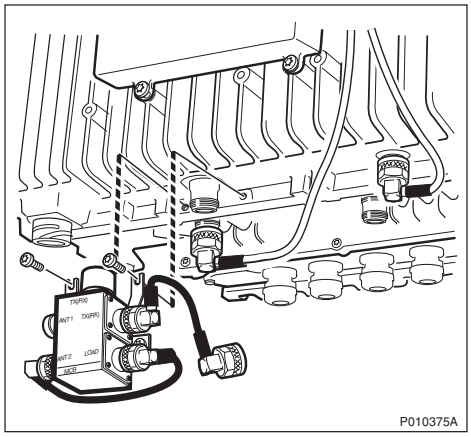
Replacing MCB

4 Remove the MCB protection cover under the RRU.



5 Make a note of the cable positions.

6 Remove the MCB cable connected to the RRU and the cables connected to the antenna(s). Remove the MCB after loosening the two screws, then disconnect it.



Note: The figure shows an example of an MCB configuration.

7 Mount the new MCB and connect all cables.

8 Put back the MCB protection cover.

Note: Ensure that cables are not trapped or damaged by the cover.

Taking the RRU Into Service

9 Inform the OMC operator that the TRXs connected to the RRU are to be taken into service.

10 Press the Local/Remote button on the RRU to set the unit to remote mode. Wait until the RF off indicator on the RRU interface panel extinguishes and the Operational indicator illuminates.

11 Close the sunshields.

Handling Replaced Units

Unless under contractual warranty, after replacement, the MCB is disposed of locally by the customer according to environmental regulations. Do not return the MCB to Ericsson for replacement, repair or disposal.

Note: Since the MCB contains Beryllium oxide, BeO, the unit must be handled according to applicable regulations for handling of such products.

9.5.6 PIB Replacement

This section describes how to replace a faulty Power Interface Board (PIB). The PIB is located in the MBU.

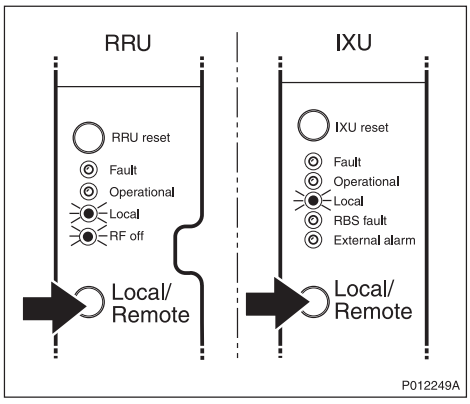
Taking the RBS Out of Operation

Note: If the PIB is mounted in an extension cabinet, only that cabinet needs to be taken out of operation.

1 Open the sunshields.

2 Contact the OMC operator to obtain permission to temporarily take cells out of service. Wait until the RF off indicator shows a continous light.

3 Press the Local/Remote button on the IXU to set the RBS to local mode. If it is an extension cabinet, press the Local/Remote button on the RRU to set the unit to local mode.

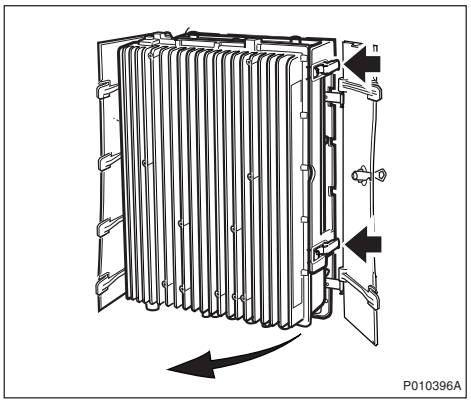


4 Switch off the AC and DC switches on the MBU.

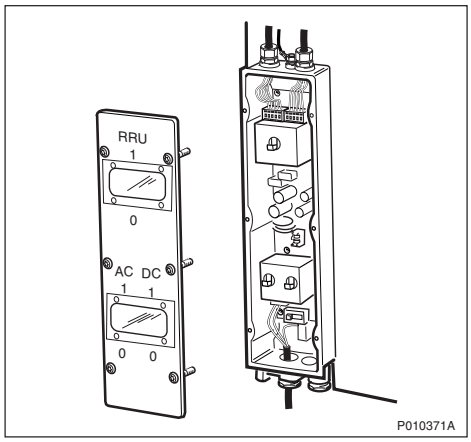
5 Switch off the AC Mains power and DC power supply outside the cabinet.

Replacing PIB

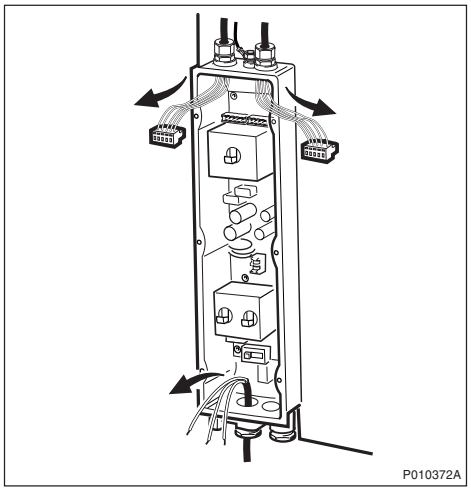
6 Open the two clasps and pull the RRU to the left side, to gain access to the power switches.



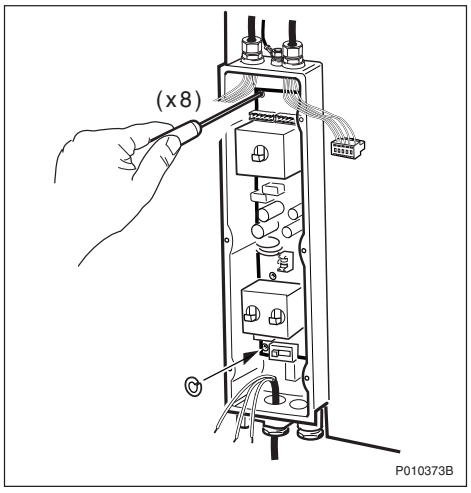
7 Remove the MBU cover.



8 Disconnect the upper AC/DC cables and the applicable power cable at the bottom.



9 Remove the PIB after loosening the securing screws.



Note: Be careful not to drop the washer attached behind the lower left screw when loosening it.

10 Insert the new PIB and secure it.

11 Ensure that the ground selector swicth is in the correct position.

Note: Remember to insert the washer behind the lower left screw.

12 Reconnect the upper AC/DC cables.

13 Reconnect the applicable AC/DC cable at the bottom.

14 Reconnect the protection earth cable.

15 Refit the cover.

16 Switch on the AC and DC switches.

17 Close the RRU.

Taking the RBS Into Operation

18 Switch on the AC Mains power and DC power supply outside the cabinet.

19 Inform the OMC operator that the applicable TRXs are to be taken into service.

20 Press the Local/Remote button on the IXU to set the units to remote mode. If it is an extension cabinet, press the Local/Remote button on the RRU to set the unit to remote mode. Wait until the RF off indicator on the RRU interface panel extinguishes and the Operational indicator illuminates.

21 Close the sunshields.

Handling Replaced Units

Unless under contractual warranty, after replacement, the PIB should be disposed of locally by the customer according to environmental regulations. Do not return the PIB to Ericsson for replacement, repair or disposal.

9.5.7 TIM Replacement

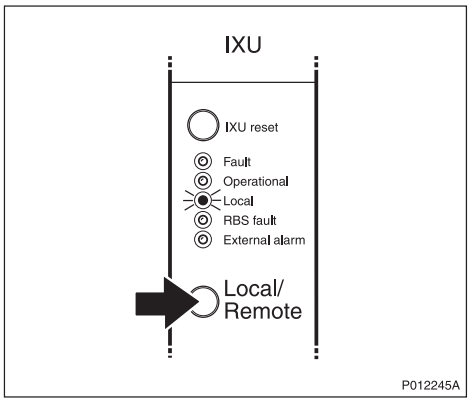
This section describes how to replace a faulty TIM.

Taking the RBS out of Operation

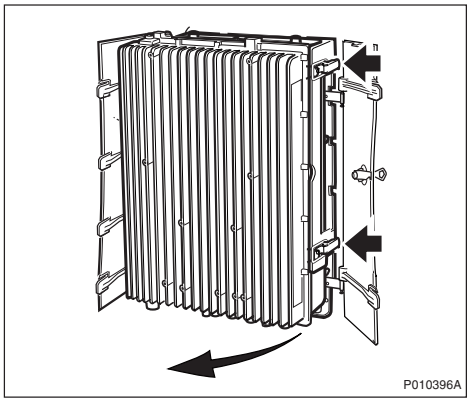
1 Open the sunshields.

2 Contact the OMC operator to obtain permission to temporarily take cells out of service. Wait until the RF off indicator (on all RRU interface panels) shows a continous light.

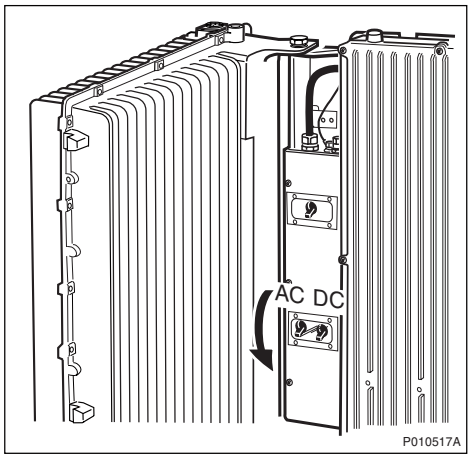
3 Press the Local/Remote button on the IXU to set the RBS to local mode. Wait until the local indicator on the IXU shows a continous light.



4 Open the two clasps and pull the RRU to the left side, to gain access to the power switches.

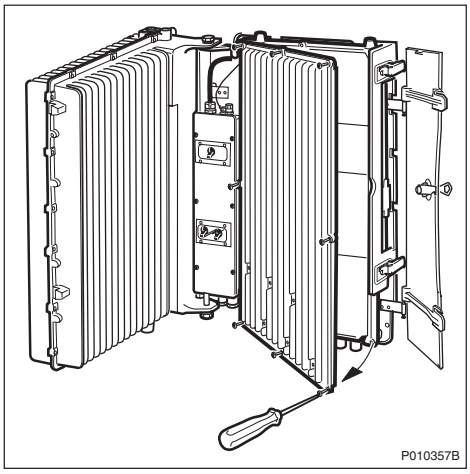


5 Switch off the AC Mains power and DC power supply.

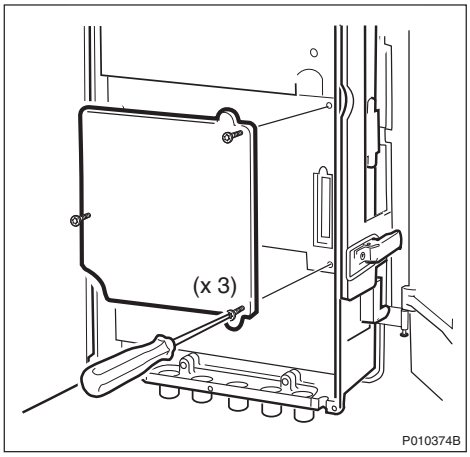


Replacing TIM

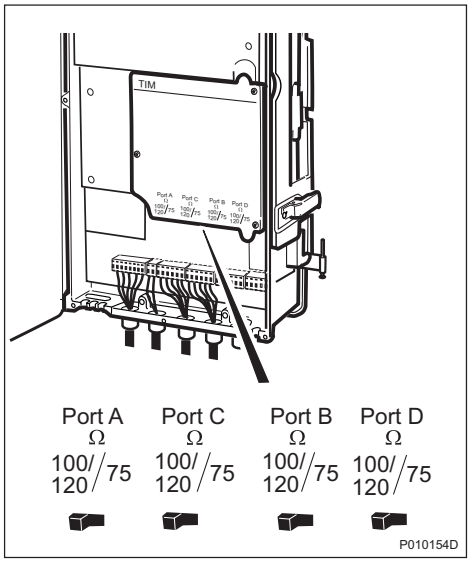
6 Open the IXU cover.



7 Remove the TIM after loosening the three screws securing it.



8 Mount the new TIM and ensure that the switches are set correctly. Tighten the screws to 1.7 Nm.



9 Close the IXU cover

Taking the RBS Into Operation

10 Switch on the AC and DC switches.

11 Close the RRU.

12 Inform the OMC operator that the applicable cells are to be taken into service.

13 Press the Local/Remote button on the IXU to set the RBS to remote mode. Wait until the RF off indicator on the RRU interface panel extinguishes and the Operational indicator illuminates.

14 Close the sunshields.

Handling Replaced Units

Unless under contractual warranty, after replacement, the TIM should be disposed of locally by the customer according to environmental regulations. Do not return the TIM to Ericsson for replacement, repair or disposal.

9.5.8 RRU Replacement

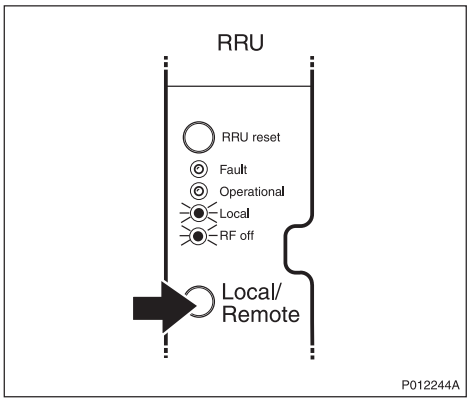
This section describes how to replace a faulty RRU.

Taking the RRU Out of Service

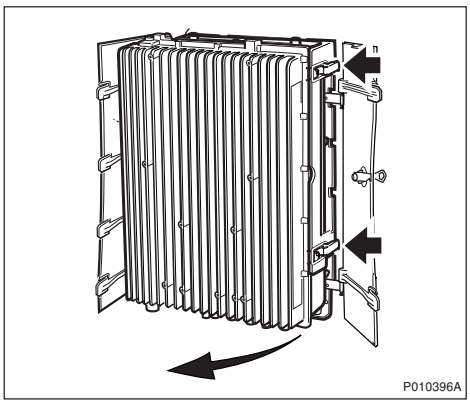
1 Open the sunshields.

2 Contact the OMC operator to obtain permission to temporarily take the TRXs connected to the RRU out of service. Wait until the RF off indicator shows a continous light.

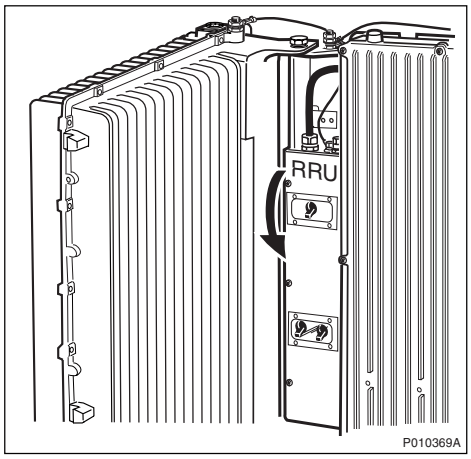
3 Press the Local/Remote button on the RRU to set the unit to local mode. Wait until the local indicator on the RRU shows a continous light.



4 Open the two clasps and pull the RRU to the left side, to gain access to the power switches.



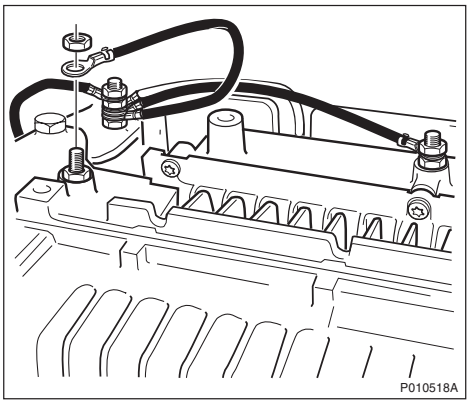
5 Switch off the RRU power.



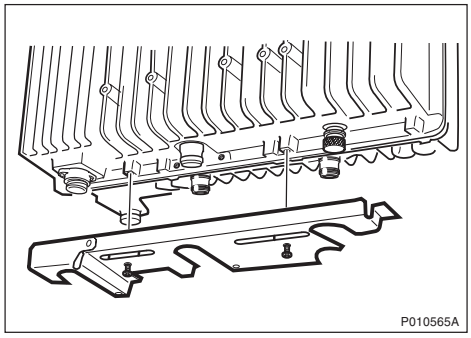
6 Remove any optional units mounted on the RRU, and, if applicable, the upper sunshield.

Replacing RRU

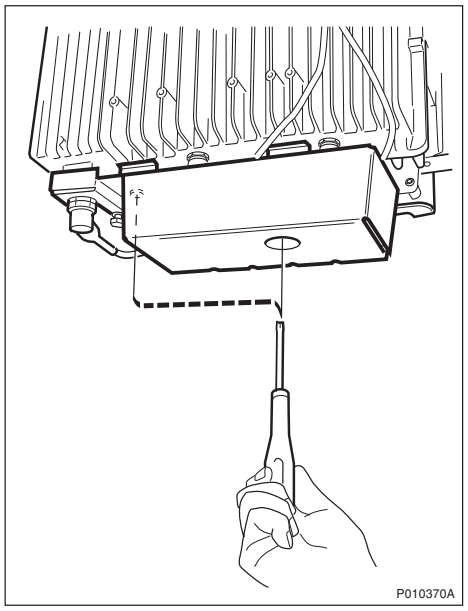
7 Disconnect the earth cable.



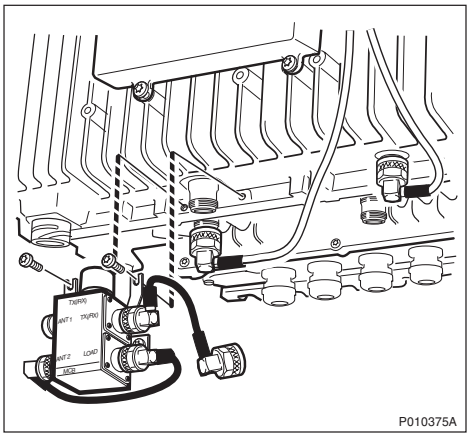
8 Remove the protection cover (if present).



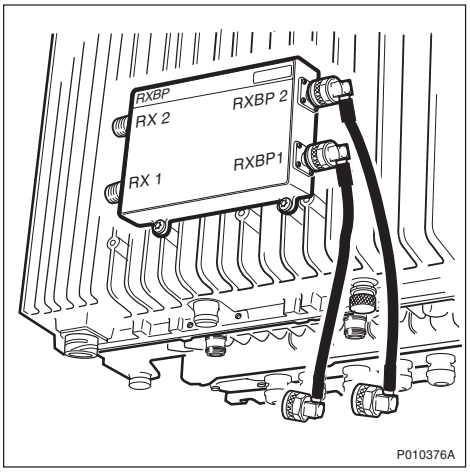
9 Remove the MCB protection cover (if present) under the RRU.



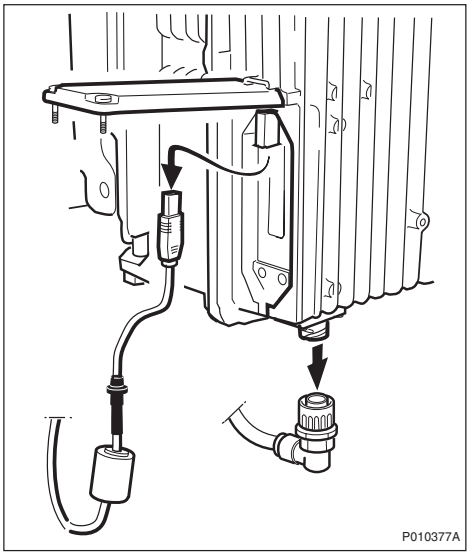
10 Remove the MCB cable (if present) connected to the RRU and the cable to the antenna. Remove the MCB after loosening the two screws and disconnect it.



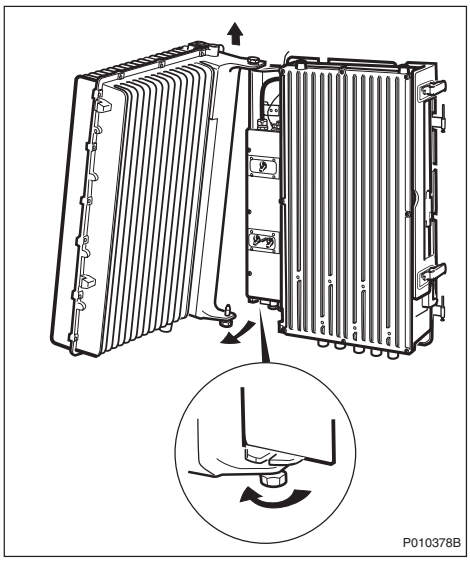
11 Remove the cables belonging to the RXBP (if present) from the RRU. Remove the RXBP after loosening the securing screws.



12 Disconnect the Y link cable and the AC/DC cable from the RRU.



13 Loosen the screw under the RRU and unhook the RRU.



14 Hang the new RRU onto the upper hinge. Position the lower hinge and tighten the screw.

15 Connect the earth cable, AC/DC cable and Y link cable.

16 Mount the RXBP (if required) and connect all cables.

17 Mount the MCB (if required) and connect all cables.

18 Fit the protection cover under the RRU.

Taking the RRU Into Service

19 Switch on the RRU power and close the RRU.

20 Put back the sunshield and fan unit, if present.

21 Inform the OMC operator that the TRXs connected to the RRU are to be taken into service.

22 Press the Local/Remote button on the RRU to set the unit to remote mode. Wait until the RF off indicator on the RRU interface panel extinguishes and the Operational indicator illuminates.

23 Close the sunshields.

Handling Replaced Units

The RRU should be returned to Ericsson for repair with a repair delivery note, LZF 084 84 (Blue Tag) attached. Include a clear description of the fault found. See *Section 9.5.12 Performing Concluding Routines on page 226* for instructions on completing a repair delivery note.

9.5.9 RXBP Replacement

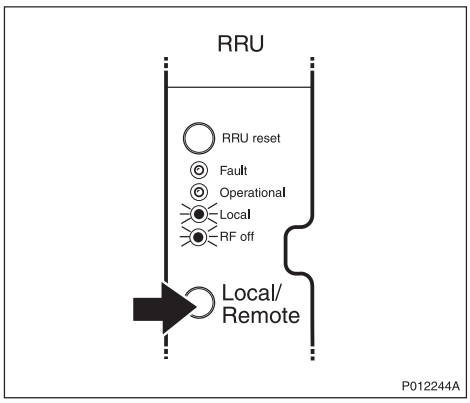
This section describes how to replace a faulty RXBP.

Taking the RRU Out of Service

1 Open the sunshields.

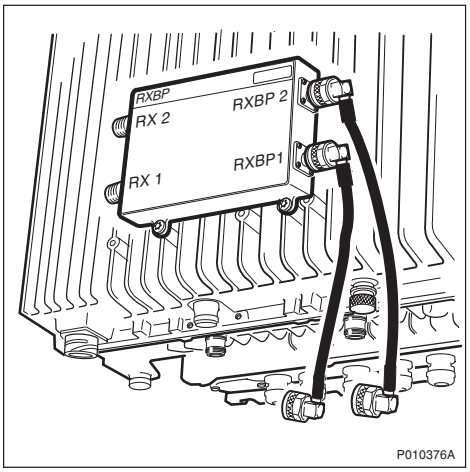
2 Contact the OMC operator to obtain permission to temporarily take the TRXs connected to the RRU out of service. Wait until the RF off indicator shows a continous light.

3 Press the Local/Remote button on the RRU to set the unit to local mode. Wait until the local indicator on the RRU shows a continous light.



Replacing RXBP

4 Remove all cables connected to the RXBP and remove it after loosening the screws securing it.



5 Mount the new RXBP and connect all cables.

Taking the RRU Into Service

6 Inform the OMC operator that the TRXs connected to the RRU are to be taken into service.

7 Press the Local/Remote button on the RRU to set the unit to remote mode. Wait until the RF off indicator on the RRU interface panel extinguishes and the Operational indicator illuminates.

8 Close the sunshields.

Handling Replaced Units

Unless under contractual warranty, after replacement, the RXBP should be disposed of locally by the customer according to environmental regulations. Do not return the RXBP to Ericsson for replacement, repair or disposal.

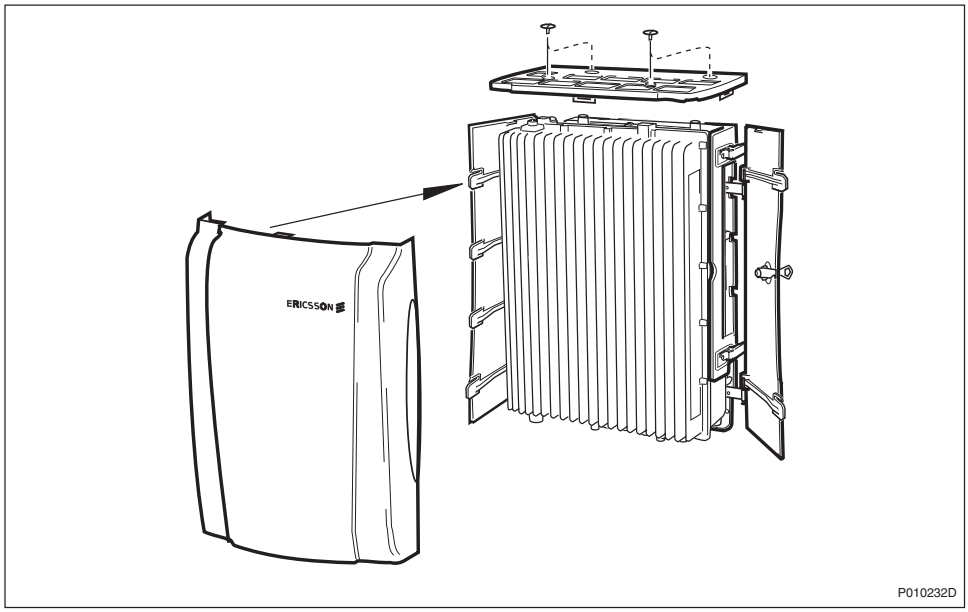
9.5.10 Sunshield Replacement

This section describes how to replace a faulty sunshield.

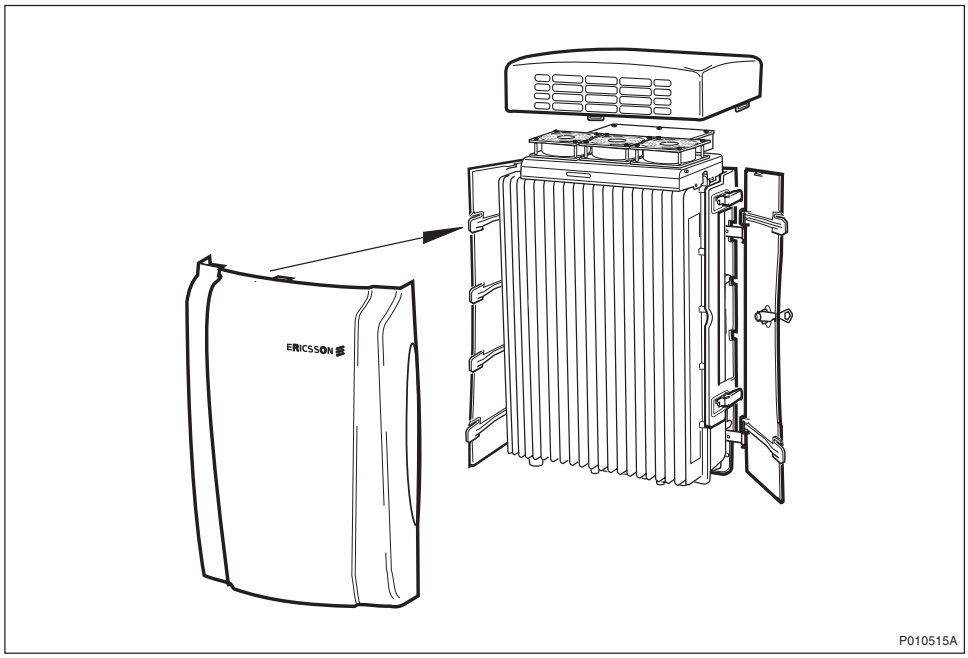
Note: Ericsson does not recommend removing the left and front sunshields.

1 Remove the faulty sunshield.

2 If a fan unit is not used, then install the top sunshield and fasten two screws to the RRU. If there is no RRU, then fasten the screws to the IXU instead.*see Figure below.*



3 If a fan unit is used, then install the fan unit cover on top of the RRU, *see Figure below*.



4 Attach the front sunshield to the left sunshield.

5 Close the front sunshield and attach it to the top shield (fan unit cover) and to the right sunshield.

6 Lock the shield.

Handling Replaced Units

Unless under contractual warranty, after replacement, the sunshield should be disposed of locally by the customer according to environmental regulations. Do not return the sunshield to Ericsson for replacement, repair or disposal.

9.5.11 Y Link Cable Replacement

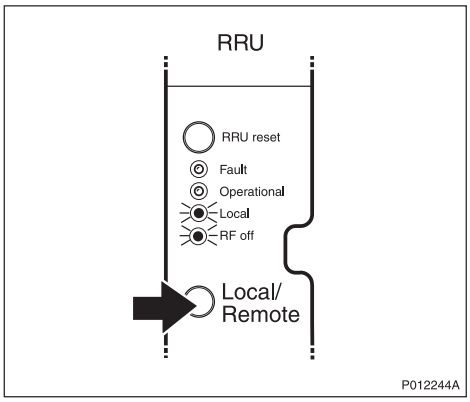
This section describes how to replace a faulty Y link cable.

Taking the RRU Out of Service

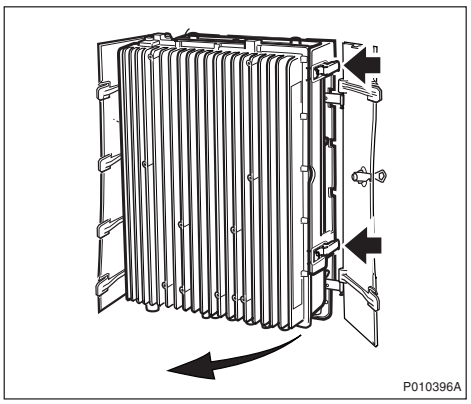
1 Open the sunshields.

2 Contact the OMC operator to obtain permission to temporarily take the TRXs connected to the RRU out of service. Wait until the RF off indicator shows a continous light.

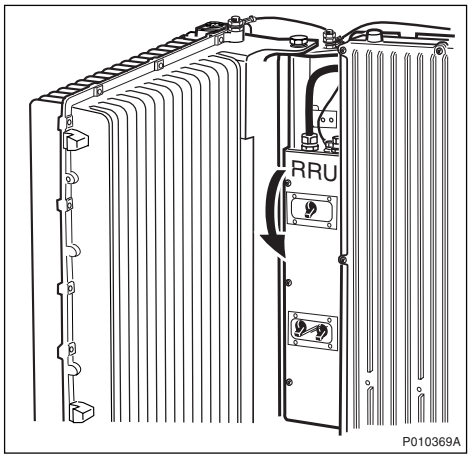
3 Press the Local/Remote button on the RRU to set the unit to local mode. Wait until the local indicator on the RRU shows a continous light.



4 Open the two clasps and pull the RRU to the left side, to gain access to the power switches.

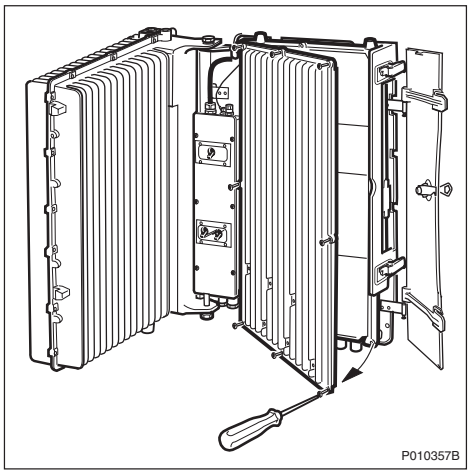


5 Switch off the RRU power.

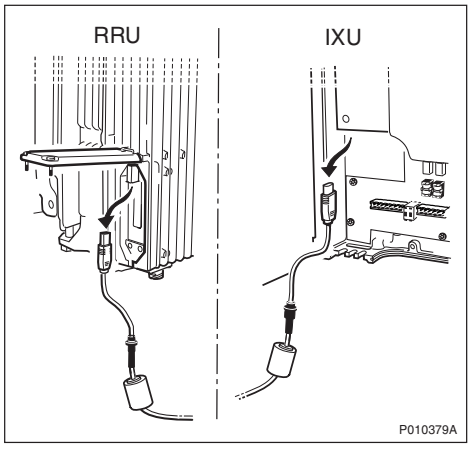


Replacing Y Link Cable

6 Open the IXU cover.



7 Remove the faulty Y link cable from the IXU. Remove the cable from the RRU by opening the Y link cover and disconnecting it.



8 Connect the new Y link cable to the RRU and close the cover.

9 Connect the new Y link cable to the IXU and close the cover.

10 Switch on the RRU power and close the RRU.

Taking the RRU Into Service

11 Inform the OMC operator that the RRU is to be taken into service.

12 Press the Local/Remote button on the RRU to set the unit to remote mode. Wait until the RF off indicator on the RRU interface panel extinguishes and the Operational indicator illuminates.

13 Close the sunshields.

9.5.12 Performing Concluding Routines

This section describes the routines to be completed before leaving the site.

Note: Ericsson strongly advises that when cleaning up after maintenance work on the RBS cabinet, the personnel performing maintenance pay particular attention to the environment. Recycle all waste materials that can be recycled and sort waste so that it can be disposed of according to local regulations.

Table 59 Objects to be Recycled or Disposed of After Cabinet Maintenance

Item	Sort or recycle?
Cable insulation from crimping, brazing or welding	Sorted with plastics
Packing chips	
Foam	
Polystyrene	
Bubble plastic	
Cable tie clippings	
Paper and wood	Paper recycling
Waste metal from cable ladders	Recycled or sorted as metals.
Pieces of cable	
Nuts, bolts, washers and screws	

Note: All packing material should be recycled, and shock absorbers disposed of, in accordance with local recycling regulations.

Updating Site Installation Documentation

1. Check the Site Installation Documentation for deviations from the installation.

2. Update the documents with the changes that apply.

3. Send to the person responsible for Site Installation Engineering.

Checking RRU and IXU Indicators

This section describes how to check that the RRU and IXU indicators show the correct status, when the RBS is connected to the BSC and is fully operational. The check should be performed before leaving the site.

Check that the indicators on the RRU(s) and the IXU have the status shown in the tables below:

Table 60 RRU Indicators After Maintenance

RRU Indicator	State
Fault	Off
Operational	On
Local	Off
RF off	Off
AC power on	On(1)
DC power on	On(1)
RRU temp.	Off

(1) Depending on power system configuration.

Table 61 IXU Indicators After Maintenance

IXU Indicator	State
Fault	Off
Operational	On
Local	Off
RBS fault	Off
External alarm	Off
AC power on	On(1)
DC power on	On(1)
IXU temp.	Off
Transmission OK	On(2)

(1) Depending on power system configuration.
(2) A, B, C and/or D, depending on transmission configuration.

Performing Final Checks

This section describes the checklist to be filled in after the maintenance has been completed.

The following checklist is not mandatory, but it is strongly recommended. Local procedures and safety regulation must be evaluated and included in this checklist.

Table 62 Checklist

Check the following:		**OK**
1	The indicators on the RRU and the IXU are in the approved status.	
2	The test equipment has been disconnected from the RBS	
3	The RBS cabinet and the mounting base are free from foreign objects.	
4	All cabinets and cables are free of damage.	
5	All EMC sealants and cable penetrations are intact.	
6	Top and bottom of cabinet are free of obstructions (for airflow).	
7	The cabinet has been locked, and the screws have been tightened.	
8	All tools have been accounted for.	
9	All paperwork has been completed.	

10 Glossary

This glossary lists abbreviations and acronyms used in texts dealing with RBS 2000 cabinets. Some basic terms and acronyms needed for cross-reference are included in the list.

Terms and Abbreviations

An arrow ⇒ is used to indicate a reference to another entry in the list.

1–P	One-Pair connection with echo cancellation (= two wires)
2–P	Two-Pair connection with echo cancellation (= four wires)
AAU	Active Antenna Unit
Abis	GSM interface standard defining attributes of the communication between the BSC and the BTS.
AC	Alternating Current
ACB	Alarm Collection Board
ACCU	Alternating Current Connection Unit
ACCU-CU	ACCU Connection Unit
ACCU-DU	ACCU Distribution Unit
A/D converter	Analog to Digital converter
AFS	AMR Full-rate speech
AGW	Abis Gateway
AHR	AMR Half-rate speech
Air conditioner	One version of the climate unit (Active cooler)
AIS	Alarm Indication Signal
ALBO	Automatic Line Build Out
ALNA	Antenna Low Noise Amplifier
ALPU	Antenna Lightning Protection Unit

AMR	Adaptive Multi-Rate
AO	Application Object
ARAE	Antenna Related Auxiliary Equipment
ARFCN	Absolute Radio Frequency Channel Number
ARP	Antenna Reference Point
ARU	Active Replaceable Unit
ASIC	Application Specific Integrated Circuit
ASU	Antenna Sharing Unit
AT	Alphanumeric Terminal
ATRU	Adaptive Transceiver Unit
ATSR	Air Time Slot Resource
AU	Antenna Unit
AWG	American Wire Gauge
BALUN	BALance and UNbalance transformer
Batt	Battery
BB	Battery Box
BBS	Battery Back-up System
BCCH	Broadcast Control CHannel
	Downlink only broadcast channel for broadcast of general information at a base station, on a base station basis.
BCS	Block Check Sequence
BDM	Battery Distribution Module
	The BDM is an IDM with a battery and a local processor.
BER	Bit Error Rate
BFF	Bit Fault Frequency
BFI	Bad Frame Indication
BFU	Battery Fuse Unit

Bias injector A unit which injects DC power into the coaxial cable to feed the TMA. Isolates the DC power from the RF signal fed to the CDU.

Bm Denotes a full-rate traffic channel

BPC Basic Physical Channel

Denotes the air interface transport vehicle formed by repetition of one time slot on one or more radio frequency channels.

BS Base Station

BSC Base Station Controller

GSM network node for control of one or more BTSs.

BSCSim Base Station Controller Simulator

BSIC Base Transceiver Station Identity Code.

BSS Base Station System

GSM network logical unit comprising one BSC and one or more BTSs.

BTS Base Transceiver Station

GSM network unit operating on a set of radio frequency channels in one cell.

burst A portion of digital information, the physical content, that is transferred within the time interval of one time slot.

cabinet The physical housing of a base station

Cascading Connection of several cabinets by the PCM cable. Similar to serial connection.

CBCH Cell Broadcast CHannel

This is a downlink only channel used by the GSM defined SMSCB function.

CCCH Common Control CHannel

Channel combining the following common control channels:

- PCH Paging CHannel
- RACH Random Access CHannel

- AGCH Access Grant CHannel

CCU Climate Control Unit

CDU Combining and Distribution Unit

CE Conformité Européenne

cell An area of radio coverage identified by the GSM network by means of the cell identity.

CEU Coverage Extension Unit

CF Central Functions

channel The common term channel denotes the virtual connection, consisting of physical and logical channels, between BSS and MS, during a call in progress.

⇒ Logical Channel ⇒ Physical Channel

Channel Combination A physical channel on an air interface carrying a defined set of logical channels.

Channel group A channel group is a group of dedicated logical channels to a specific MS.

CM Control Module (for TMA)

CMD Digital Radio Communication Tester

CME 20 Cellular Mobile Europe

- CME 20 Ericsson digital land mobile telecommunication system based on the GSM standards.

- CME 201 Ericsson GSM system comprising Ericsson equipment only.

CMRU Central Main Replaceable Unit.

The RBS is physically connected to the Base Station Controller (BSC) via the CMRU. There is only one CMRU in each RBS (DXU or IXU). For RBSs without DXU or IXU the whole RBS is regarded as CMRU.

Macro	CMRU = DXU
Micro	CMRU = The whole RBS
RBS 2308	CMRU = IXU

RBS 2309 CMRU = IXU

RBS 2109 CMRU = IXU

CMS 40 Cellular Mobile System

Ericsson digital land mobile telecommunication system based on the Joint Technical Committee (JTC) specification for PCS 1900.

CNU Combining Network Unit

Compr Compressor

CON LAPD concentrator

LAPD concentration is used to reduce the number of required physical links between the BSC and BTS.

Config Configuration

Co-siting Co-siting is the operation of radio equipment from more than one mobile telephone system and/or frequency on the same site sharing common equipment.

CPI Communication and Power Interface

CPI Customer Product Information

CPU Central Processing Unit

CRC Cyclic Redundancy Check

CS Coding Scheme

CSA Canadian Standards Association

CSES Consecutive Severely Errored Second

CSU Channel Service Unit

CU Combining Unit (RU in CDU_D)

CXU Configuration Switch Unit

dB decibel

dBm Decibel per 1 milliwatt

DB DataBase

DC Direct Current

DCC	Digital Cross Connector
DCCH	Dedicated Control CHannel
	Dedicated control channels carry signalling data.
DCCU	DC Connection Unit
ddTMA	dual duplex Tower Mounted Amplifier
DF	Distribution Frame
DF	Disturbance Frequency
DFU	Distribution and Fuse Unit
DIP	DIgital Path
	The name of the function used for supervision of the connected PCM lines.
DM	Degraded Minute
DM	Distribution Module
DMRU	Distributed Main Replaceable Unit
	If a Main RU is subordinated to the CMRU, it is said to be distributed.
downlink	Signalling direction from the system to the MS.
DP	Digital Path
DP	Distribution Panel
DPX	Duplexer
DS1	Digital Signal level 1 (1544 kbit/s)
DSP	Digital Signal Processor
DT	Data Transcript
DTE	Data Terminal Equipment
DTF	Distance To Fault
dTMA	duplex TMA
dTRU	double TRansceiver Unit
DU	Distribution Unit (RU in CDU-D)

DUT	Device Under Test
DX	Direct Exchange
DXB	Distribution Switch Board
DXC	Digital Cross Connector
DXU	Distribution Switch Unit
DXX	Ericsson Cellular Transmission System including NMS
E1	Transmission standard, G.703, a 2048 kbit/s PCM link
E-GSM	Extended GSM
EACU	External Alarm Connection Unit
EBB	External Battery Backup
EC1	External Condition Map Class 1
EC2	External Condition Map Class 2
ECU	Energy Control Unit
EDGE	Enhanced Data rate for Global Evolution
EDGE dTRU	EDGE double TRansceiver Unit
	⇒ EDGE
EDT	Electrical Down Tilt
EEPROM	Electrically Erasable Programmable Read-Only Memory
EIRP	Effective Isotropic Radiated Power
EMC	ElectroMagnetic Compatibility
EMF	ElectroMotive Force
EMF	ElectroMagnetic Field
EMI	Electromagnetic Interference
ENV	Environmental
EOC	Embedded Operations Channel
EPC	Environmental and Power Control
ES	Errored Second

ESB	External Synchronization Bus
ESD	ElectroStatic Discharge
ESF	Extended Superframe Format
ESO	Ericsson Support Office
ETS	European Telecommunication Standard
ETSI	European Telecommunication Standard Institute.
EXT	External
FACCH	Fast Associated Control CHannel Main signalling channel in association with a TCH.
FCC	Federal Communications Commission
FCCH	Frequency Correction CHannel
FCOMB	Filter COMBiner
FCU	Fan Control Unit
FDL	Facility Data Link
FDU	Feeder Duplexer Unit
FER	Frame Erasure Ratio
FIU	Fan Interface Unit
FS	Function Specification
FSC	Field Support Centre
FU	Filter Unit (RU in CDU-D)
FUd	Filter Unit with duplexer (RU in CDU-D)
FXU	Future Expansion Unit
G01	MO model for RBS 200
G12	MO model for RBS 2000
G.703	Physical/electrical characteristics of hierarchical digital interfaces, as defined by the ITU.
G.704	Synchronous frame structures used at 1544, 6312, 2048, 8448 and 44 736 kbit/s, as defined by the ITU.

GPRS	General Packet Radio Services
GPS	Global Positioning System
GS	General Specification
GSL	GPRS Signalling Link
GSM	Global System for Mobile communications International standard for a TDMA digital mobile communication system. Originally, GSM was an abbreviation for Group Special Mobile, which is a European mobile telecommunication interest group, established in 1982.
GSM 800	GSM system 800 MHz (generic)
GSM 900	GSM system 900 MHz (generic)
GSM 1800	GSM system 1800 MHz (generic)
GSM 1900	GSM system 1900 MHz (generic)
HCE	HDSL Central Equipment
HCOMB	Hybrid COMBiner
HDLC	High level Data Link Control
HDSL	High bit rate Digital Subscriber Line
Heat Exchanger	A version of the climate unit
HEU	Heat Exchanger Unit
HISC	Highway Splitter Combiner
HLIN	High Level IN
HLOUT	High Level OUT
HMS	Heat Management System
HTU	HDSL Terminating Unit
Hum	Humidity
HW	HardWare
HWU	HardWare Unit

	An HWU consists of one or more SEs. An HWU is a functional unit within the RBS. The HWU is either active (equipped with a processor) or passive (without processor).
I1A	Internal Fault Map Class 1A
I1B	Internal Fault Map Class 1B
I2A	Internal Fault Map Class 2A
IA	Immediate Assignment
IC	Integrated Circuit
ICMI	Initial Codec Mode Indicator
ID	Identity
IDB	Installation DataBase
IDM	Internal Distribution Module
IEC	International Electric Commission
IFB	Interface Board
IF Box	Interface Box
IMSI	International Mobile Subscriber Identity
INIT	Initial
INT	Internal
IOG	Input/Output Group
IOM	Internal Operation and Maintenance bus
IR	InfraRed
IS	Interface Switch
IWD	InterWork Description
IXU	Interface and Switching Unit
JTC	Joint Technical Committee
LAN	Local Area Network
LAPD	Link Access Procedures on D-channel

	LAPD is the data link layer (layer 2) protocol used for communication between the BSC and the BTS on the Abis interface. Abis layer 2 is sometimes used synonymously with LAPD.
LBO	Line Build Out
LED	Light Emitting Diode
LLB	Line Loop Back
LNA	Low Noise Amplifier
Local bus	The local bus offers communication between a central main RU (DXU) and distributed main RUs (TRU and ECU).
Local mode	When the RU is in Local mode, it is not communicating with the BSC.
Local/Remote switch	A switch used by the operator to order the RU to enter Local or Remote mode.
LOF	Loss Of Frame
Logical Channel	A logical channel represents a specified portion of the information carrying capacity of a physical channel. GSM defines two major categories of logical channels: • TCHs – Traffic CHannels, for speech or user data • CCHs – Control CHannels, for control signalling ⇒ Physical Channel ⇒ Channel Combination
Logical RU	A unit which can be referred to, but is not a single physical unit.
LOS	Loss Of Signal
LVD	Low Voltage Directive
LVF	Low Voltage Filter
MAC	Medium Access Controller
MADT	Mean Accumulated DownTime
magazine	A magazine is a reserved space in the cabinet, which may hold one or more RUs.

Main RU	Contains one or more processors, to which software can be downloaded from the BSC. A Main RU is either Central (CMRU) or Distributed (DMRU). A Main RU may or may not have a direct signalling link to the BSC.
MBU	Mounting Base Unit
MCB	MultiCasting Box
MHS	Modification Handling System Ericsson trouble report database
MiniLink	Ericsson's microwave transmission system.
MMI	Man-Machine Interface
MO	Managed Object
MR	Measurement Receiver
MRT	Mean Repair Time
MS	Mobile Station
MSC	Mobile services Switching Centre GSM network unit for switching, routing and controlling calls to and from the Public Switched Telephone Network (PSTN) and other networks.
MSTP	Mobile Station Test Point
MTBF	Mean Time Between Failure
MTBCF	Mean Time Between Catastrophe Failure
Multidrop	Two or more RBSs connected in a chain to the same transmission system. All the relevant time slots are dropped out by each RBS. (This function is sometimes called cascading.)
N/A	Not Applicable
NCS	National Colour System
NEBS	Network Equipment Building System
NMS	Ericsson Network Management System in DXX
Nominal Power	The nominal power is the power level defined when configuring the transceiver.

N terminal	Neutral terminal in an AC mains connection
NTU	Network Terminating Unit
OL/UL	Overlaid/Underlaid
O&M	Operation and Maintenance General term for activities such as configuration, utilization of channels (frequency bands), cell planning, system supervision, hardware and software maintenance, subscriber administration, and so on.
OMC	Operation and Maintenance Centre
OML	Operation and Maintenance Link Layer 2 communication link for operation and maintenance services on Abis.
OMT	Operation and Maintenance Terminal The OMT is a PC application for O&M of an RBS.
Operation	Operation is the normal, everyday running of the RBS with full functions.
OPI	OPerational Instructions
OTU	Outdoor Terminating Unit
OVP	OverVoltage Protection
OXU	Space for Optional Expansion
P-GSM	Primary GSM
PA	Power Amplifier
PAM	Power Amplifier Module
Passive RU	A passive replaceable unit has a very low level of intelligence and is independent of the processor system.
PBA	Printed Board Assembly
PBC	Power and Battery Cabinet
PC	Personal Computer
PCB	Printed Circuit Board
PCH	Paging CHannel

	Downlink only subchannel of CCCH for system paging of MSs. ⇒ CCCH
PCM	Pulse Code Modulation
PCU	Packet Control Unit
PDCH	Packet Data Channel
PE terminal	Protective Earth terminal in an AC mains connection
PFWD	Power Forward
Physical Channel	An air interface physical channel carries one or more logical channels. A physical channel uses a combination of frequency and time division multiplexing and is defined as a sequence of radio frequency channels and time slots. ⇒ TDMA frame ⇒ Logical channel
PIB	Power Interface Board
PIN	Personal Identification Number
PLB	Payload Loop Back
PLMN	Public Land Mobile Network A network, established and operated by an administration or its licensed operator(s), for the specific purpose of providing land mobile communication services to the public. It provides communication possibilities for mobile users. For communication between mobile and fixed users, interworking with a fixed network is necessary.
PPE	Personal Protective Equipment
PREFL	Power Reflected
PSA	Power Supply Adapter
PSTN	Public Switch Telephone Network
PSU	Power Supply Unit
PWU	Power Unit

RACH	Random Access CHannel Uplink only subchannel of CCCH for MS request for allocation of a dedicated channel. ⇒ CCCH
RAI	Remote Alarm Indication
RAM	Random Access Memory
RBER	Radio Bit Error Ratio
RBS	Radio Base Station All equipment forming one or more Ericsson base station. ⇒ BTS
RCB	Radio Connection Box
RD	Receive Data
Remote mode	When the RU is in RU Remote mode, a link is established between the BSC and the Central Main RU (CMRU).
RF	Radio Frequency
RFCH	Radio Frequency CHannel A radio frequency carrier with its associated bandwidth.
RFTL	Radio Frequency Test Loop
RLC	Radio Link Control
RLC	Repair Logistic Centre
RRU	Remote Radio Unit
RSL	Radio Signalling Link
R-state	Release state
RS232	American standard for term/MODEM interconnection.
rTMA	Receiver TMA
RTN	Return
RU	Replaceable Unit

	An RU consists of one or more HWUs. An RU may be replaced by another RU of the same type. The RU is the smallest unit that can be handled on site.
RX	Receiver
RX1	Receiver antenna branch 1
RX2	Receiver antenna branch 2
RXA	Receiver antenna branch A
RXB	Receiver antenna branch B
RXBP	Receiver BandPass filter
RXD	Receiver Divider
RXDA	Receiver Divider Amplifier
RXDP	Receiver Distribution Plane
RXLEV	Measure of signal strength as defined in GSM:05.08:8.1.4
RXQUAL	Measure of signal quality as defined in GSM:05.08:8.2.4
SACCH	Slow Associated Control CHannel
SCC	Site Cell Configuration
SCH	Synchronization CHannel
SCU	Switching and Combining Unit
SDCCH	Stand alone Dedicated Control CHannel
	Main dedicated signalling channel on the air interface, mainly used for call locating and establishment.
SE	Supervised Entity
SEC	Site Extension Configuration
SES	Severely Errored Second
SF	Slip Frequency
SID	Silence Descriptor
SIG	Signalling
SIM	Subscriber Identity Module

SMS	Short Message Service (point to point) A short message, up to 160 alphanumeric characters long, can be sent to or from an MS (point to point).
SO	Service Object
SS	Swedish Standard
sTRU	single Transceiver Unit
Sub-RU	A sub-replaceable unit is always connected to a superior Main RU. This connection is used for example for retrieval of the RU identity. A sub-RU normally does not have a processor. Note that an RU with a processor, which cannot be loaded, is classified as a sub-RU.
SVS	System Voltage Sensor
SW	SoftWare
SWR	Standing Wave Ratio
SYNC	Synchronous
T1	Transmission standard, G.703, a 1544 kbit/s PCM link
TA	Timing Advance A signal sent by the BTS to the MS which the MS uses to advance its timing of transmissions to the BTS to compensate for propagation delay.
TC	Transaction Capabilities
TCB	Transceiver Control Board
TCH	Traffic CHannel The traffic channels carry either encoded speech or user data.
TCH/F	Traffic Channel, Full-rate
TCH/H	Traffic Channel, Half-rate
TCC	Transmission Coherent Combining
TCH SIG	Traffic CHannel Signalling
TD	Transmit Data
TDMA	Time Division Multiple Access

	Multiplexing of several channels in a common frequency band. Each channel is assigned a certain time division, a time slot.
TDMA frame	GSM air interface time frame comprising eight time slots.
TEI	Terminal Endpoint Identifier TEI is an identification code carried by a LAPD frame as a terminal connection endpoint within a Service Access Point (SAP).
TEMS	TEst Mobile Station
TF	Timing Function
TG	Transceiver Group
TIM	Transmission Interface Module
Timing bus	The timing bus carries air timing information from the timing unit in the DXU to the TRUs.
TLS	Terrestrial Link Supervision
TM	Transport Module The Transport module is non-RBS equipment belonging to the transport network.
TMA	Tower Mounted Amplifier
TMA-CM	Tower Mounted Amplifier – Control Module
TN	Time slot Number
TN O&M	Transport Network Operation and Maintenance (in general)
TRA	Transcoder Rate Adapter The TRA Unit (TRAU) in BSC performs transcoding of speech information and rate adaptation of data information.
TRS	Transceiver System
TRU	Transceiver Unit
TRX	Transceiver (combined transmitter and receiver)
TRXC	Transceiver Controller

TS	Time Slot A 0.577 ms period (TDMA frame subunit) corresponding to 156.25 raw bits of information. The eight time slots of each TDMA frame are numbered 0...7. ⇒ Burst
TT	Total Time
TU	Timing Unit
TX	Transmitter
TXA	Transmitter Antenna A
TXB	Transmitter Antenna B
TXBP	Transmitter BandPass filter
TXU	Radio Transmitter Unit
UAS	Unavailable Seconds
UAST	UnAvailable STate supervision
UL	Underwriter Laboratories
uplink	Signalling direction from the MS to the system.
UPS	Uninterrupted Power Supply
VCO	Voltage Controlled Oscillator
VSWR	Voltage Standing Wave Ratio RF signal measure. The quotient between transmitted and reflected voltage.
X bus	The X bus carries transmit air data frames between transceivers.
Y link	The interface between the DXU and each DSP System in core based TRUs.